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ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR) FOR THE PROPOSED DREHID WIND FARM, CO. KILDARE

VOLUME 2 - MAIN EIAR

CHAPTER 8.1 - BIODIVERSITY

Prepared for:

North Kildare Wind Farm Ltd.

Date: May 2025

Document No:

P22-242-FT-EGN-XX-RP-EN-0008-1

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8. [8-1] BIODIVERSITY

8.1 Introduction

This chapter has been prepared to examine any potential impacts of the Proposed Wind Farm, Proposed Substation, grid connection and turbine delivery route on ecological receptors in the local environment.

Mitigation measures to reduce or eliminate effects on ecological receptors are prescribed as necessary. The assessment also considers cumulative impacts associated with other nearby developments.

A full description of the Proposed Development assessed in this EIAR is provided in Chapter 3 Development Description and comprises the following elements:

- The wind farm site (referred to in this EIAR as 'The Proposed Wind Farm');
- The grid connection, comprising a 110 kV substation and loop-in connection to the existing 110 kV overhead line (referred to in this EIAR as the 'The Proposed Substation');
- The turbine delivery route (referred to in this EIAR as the 'TDR').

8.2 Legislation and Policy

The species and habitats provided National and International protection under the following legislative and policy documents have been considered in this Impact Assessment.

8.2.1 European Legislation

The EU Habitats Directive (Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna) (as amended) (the 'Habitats Directive') together with the Birds Directive (Council Directive 2009/147/EC on the Conservation of Wild Birds) (as amended) (the 'Birds Directive') are the main legislative instrument for the protection and conservation of biodiversity within the European Union (EU).

The Habitats Directive lists habitats and species that must be protected within Special Areas of Conservation (SAC) within Annexes I and II, respectively. The Habitats Directive also identifies plant and animal species within Annex IV which are subject to strict protection anywhere they occur.

The Birds Directive provides for the identification of a network of Sites in all member states to protect birds at their breeding, feeding, or roosting areas. The Birds Directive identifies in Annex I species that are rare, in danger of extinction, or vulnerable to changes in habitat and which require special protection and areas for their conservation: Special Protection Areas (SPA).

The Habitats Directive and Birds Directive have been transposed into Irish law, by Part XAB of the Planning and Development Act 2000 (as amended) and by the European Communities (Birds and Natural Habitats) Regulations 2011, as amended.

The EU Water Framework Directive (2000/60/EC) (as amended) requires all Member States to protect and improve water quality in all waters in order to achieve good ecological status by 2015 or, at the latest, by 2027. This was transposed into Irish Law by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003) and by the European Communities Environmental Objectives (Surface Waters) Regulations 2009 as amended and European Union Environmental Objectives (Freshwater Pearl Mussel) (Amendment) Regulations 2009 as amended. The Directive applies to rivers, lakes, groundwater, and transitional coastal waters. The Directive requires management plans to be prepared on a river basin basis and specifies a structured method for developing these plans. The third cycle River Basin Management Plan 2022-2027 is currently under preparation.

8.2.2 National Legislation

The primary domestic statute providing for wildlife protection in Ireland is the Wildlife Act of 1976 as amended (the 'Wildlife Act'). All bird species are protected under the Wildlife Acts from offences including intentional killing or injury and disturbance during the breeding season (to include eggs, young, and nests which are also protected). A range of mammal species, two amphibian species, one butterfly species, and one reptile species are all similarly protected from intentional killing or injury, whilst the breeding or resting Sites of these species are also protected. The amendment to the Act in 2000 broadens its scope to include fish and aquatic invertebrate species. The Act also provides a mechanism to give statutory protection to Natural Heritage Areas (NHAs).

The Wildlife (Amendment) Act 2023 introduced a new public sector duty on biodiversity. The legislation provides that every public body, as listed in the Act, is obliged to have regard to the objectives and targets in the National Biodiversity Action Plan (2023-2027).

A number of vascular (i.e. flowering) and non-vascular plant species (i.e. nonflowering) are afforded legal protection under the Flora (Protection) Order, 2022 enacted under Section 21 of the Wildlife Act, 1976. It is an offence to cut, pick, collect, uproot, or otherwise take, injure, damage, or destroy any specimens of the species listed under the Flora Protection Order.

Beyond the national statutes which transpose the Water Framework Directive into national law, there are several older national Acts which are intended for the protection of fisheries and the aquatic environment as follows:

- Section 171 of the Fisheries (Consolidation) Act 1959 creates the offence of throwing, emptying, permitting or causing to fall onto any waters deleterious matter. Deleterious matter is defined as not only as any substance that is liable to injure fish but is also liable to damage their spawning grounds or the food of any fish or to injure fish in their value as human food or to impair the usefulness of the bed and soil of any waters as spawning grounds or other capacity to produce the food of fish.
- Under Section 3 of the Local Government (Water Pollution) Act, 1977 (as amended by Sections 3 and 24 of the 1990 Act) it is an offence to cause or permit any polluting matter to enter waters.

8.2.3 ***National Policy***

Ireland's fourth National Biodiversity Plan (2023-2030) was launched January 2024. The plan sets the national biodiversity agenda for the period 2023-2030 and aims to deliver the transformative changes required to the ways in which we value and protect nature. The 4th NBAP strives for a "whole of government, whole of society" approach to the governance and conservation of biodiversity. The aim is to ensure that every citizen, community, business, local authority, semi-state and state agency has an awareness of biodiversity and its importance, and of the implications of its loss, while also understanding how they can act to address the biodiversity emergency as part of a renewed national effort to "act for nature".

This National Biodiversity Action Plan 2023-2030 builds upon the achievements of the previous Plan. It will continue to implement actions within the framework of five strategic objectives, while addressing new and emerging issues:

- Objective 1 - Adopt a Whole of Government, Whole of Society Approach to Biodiversity
- Objective 2 - Meet Urgent Conservation and Restoration Needs
- Objective 3 - Secure Nature's Contribution to People
- Objective 4 - Enhance the Evidence Base for Action on Biodiversity
- Objective 5 - Strengthen Ireland's Contribution to International Biodiversity Initiatives

8.3 Consultation

The consultation process carried out for the project began with previous iterations of the Proposed Wind Farm, starting with the 2018 application. A Scoping Update Letter was issued out to all consultees in 2024 to update them of amendments to the site layout, and the inclusion of the Proposed Substation, which differed from the proposed method of connecting to the grid in the 2018 design.

The full list of the bodies consulted as part of the environmental assessment of the project are presented in Chapter 2/5 - Background to the Proposed Wind Farm/Need for the Proposed Wind Farm. Specific to biodiversity, the environmental stakeholders listed in Table 8-1 were contacted. Their responses are detailed in Table 8-1.

Table 8-1: Environmental stakeholder consultation

Organisation/Stakeholder	Response (2018)	Response (2024)
An Taisce	No response to date	No response to date
Bat Conservation Ireland	No response to date	No response to date
Birdwatch Ireland	No response to date	No response to date
Department of Culture, Heritage and the Gaeltacht (2018) Department of Housing, Local Government & Heritage (2024) (via DAU)	Acknowledgement of receipt of correspondence. Information on consultation to be solely administered to DAU for distribution to the National Parks and Wildlife Service and the National Monuments Service. A further response outlining details of information to be supplied in advance of any meetings, and information which should not be supplied at pre-applications stage was issued on 13 November 2018.	Response from the DAU provided generic advice on the preparation of the Cultural Heritage Impact Assessment.
EPA	No response to date	No response to date
Inland Fisheries Ireland	Comments and observations of a general nature provided by IFI. Observations noted include potential impacts to fisheries waters, forming part of the Eastern River Basin District. The role of smaller watercourses as contributories to downstream habitats, of which have the potential to convey deleterious matter from development works and regard should be had to this. Temporary crossing structures should follow IFI recommendations.	No response to date
Irish Peatland Conservation Council	Consultation response identifies the Mulgeeth Bog, an intact raised bog remnant that must be protected. The consultation response requests detail on how the Proposed Wind Farm will be hydrologically managed to enhance and conserve the bog which is a refuge for Common Frog. The response also notes a proposed Timahoe North Solar Farm, adjacent to the Proposed Wind Farm boundary. A response is sought for confirmation of provisioning of adequate setback from the wind turbines taking into account Curlew. Request also made for demonstrations of the proposals the developer is making to develop amenity value and how this dovetails with the solar project walk routes as proposed.	No response to date

Organisation/Stakeholder	Response (2018)	Response (2024)
Irish Raptor Study Group	No response to date	No response to date
Irish Red Grouse Association	No response to date	No response to date
Irish Wildlife Trust	No response to date	No response to date
South Eastern River Basin District	No response to date	No response to date

8.4 Statement of Authority

An ecological appraisal of the proposed project was undertaken by Fehily Timoney and Company (FT) to inform this chapter. The lead author of this chapter is Ben O'Dwyer (FT Senior Project Ecologist, BSc. Wildlife Biology). Ben has over eight years ecological consultancy experience and has prepared EcIAs, EIAR Biodiversity chapters, AA Screening reports and Natura Impact Statements for numerous large scale infrastructure projects in the renewable energy, commercial, waste management and transport sectors.

The chapter was reviewed by Jon Kearney (FT Technical Director of Ecology, BSc. Applied Ecology, MSc. Ecological Management and Biological Conservation). Jon has 20 years of ecological consultancy experience working in both the UK and Ireland.

The full list of contributors to ecological baseline surveys and reporting is detailed in Appendix 8.1-1. Surveyor biographies and qualifications for all contributors are also included in Appendix 8.1-1.

8.5 Methodology

8.5.1 Relevant Guidance

The methodology for this appraisal has been devised in accordance with the following relevant guidance published by the Environmental Protection Agency (EPA) including '*Guidelines on the information to be contained in Environmental Impact Statements* (2022), and '*Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*' (DoHPLG, 2018).

Additional guidance available from the EU such as '*Guidance document on wind energy developments and EU nature legislation*' (2020) and '*Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*' (2013) has also been adhered to. The appraisal also adheres to *CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (Version 1.2) published by the Chartered Institute of Ecology and Environmental Management (CIEEM) (2018; last updated April 2022).

The Heritage Council publication '*Best Practice Guidance for Habitat Survey and Mapping*' (Smith *et al*., 2011) was applied in the completion of habitat surveys and production of habitat mapping.

Relevant guidance published by the National Roads Authority (NRA) such as '*Guidelines for Assessment of Ecological Impacts of National Road Schemes*' (2009a), and '*Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*' (2008a) have also been followed.

The Inland Fisheries Ireland publication '*Guidelines on protection of fisheries during construction works in and adjacent to waters*' (IFI, 2016) has been applied.

The following guidelines in relation to bats were adhered to:

- *Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation* (SNH, 2019 and NatureScot 2021)
- *Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland (NIEA, May 2022)*
- *Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. (Marnell et. al, 2022)*
- *Bat Survey Guidelines: Traditional Farm Buildings Scheme (Aughney et al., 2008)*
- *Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn). (BCT/Collins, 2016) The Bat Conservation Trust, London. (noting that the approach to surveys equally align to 4th edition published in September 2023)*
- *Wind Turbine/Wind Farm Development Bat Survey Guidelines (Bat Conservation Ireland, 2012);*
- *Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (NRA, 2006a);*
- *Bats and Onshore Wind Turbines – Interim Guidance (3rd Edition) (Carlin, 2014);*
- *Guidelines for the Treatment of Bats during the Construction of National Road Schemes (NRA, 2006b);*
- *Bat survey – NIEA Specific Requirements for wind farm (NIEA, 2014);*
- *Guidelines for Consideration of Bats in Wind Farm Projects (Rodrigues, 2008).*

Relevant guidance published by the National Roads Authority (NRA), and applicable to assessing biodiversity, was also followed, including '*Guidelines for the Assessment of Ecological Impacts of National Road Schemes – Revision 2*' (NRA 2009a), '*Ecological surveying techniques for protected flora and fauna during the planning of National Road Schemes – Version 2*' (NRA 2009b), '*Environmental Impact Assessment of National Road Schemes – A practical guide*' (NRA 2008b),'*Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes*' (NRA 2008a) and '*Guidelines on protection of fisheries during construction works in and adjacent to waters*' (IFI, 2016).

8.5.2 Desktop Study

A desk study was carried out to collate and review available information, datasets and documentation sources pertaining to the natural environment in which the proposed project is situated. The following sections detail the desktop study methodologies utilised in the assessment.

8.5.2.1 Designated Nature Conservation Sites

Special Areas of Conservation (SACs) and Special Protection Areas for Birds (SPAs) are designated under the EU Habitats Directive and EU Birds Directive, respectively and are collectively known as 'European Sites'.

In relation to European Sites, a Natura Impact Statement has been prepared to provide the Competent Authority with the information necessary to complete an Appropriate Assessment of the Proposed Wind Farm in compliance with Article 6(3) of the Habitats Directive. The potential for significant effects on European Sites and adverse impacts on the integrity of European Sites is fully assessed within the AA Screening Report (AASR) and Natura Impact Statement (NIS), respectively, that accompany this application.

Natural Heritage Areas (NHAs) are designated under Section 18 the Wildlife (Amendment) Act 2000 and their management and protection is provided for by this legislation and planning policy. Proposed Natural Heritage Areas (pNHAs) were designated on a non-statutory basis in 1995 but have not since been statutorily proposed or designated; however, for the purposes of this assessment they have been considered as fully designated sites. Nationally designated Sites that are also designated as European Sites have been assessed as those designations within the Appropriate Assessment Screening Report and NIS, with the relevant conclusions recorded and referenced in this chapter.

The following methodology was used to establish which protected sites designated for nature conservation are within the Likely Zone of Influence of the Proposed Wind Farm and have the potential to be impacted by the Proposed Wind Farm:

- Initially the most up to date GIS spatial datasets for European and Nationally designated sites were downloaded from the NPWS website (www.npws.ie) on 08/04/2025. The datasets were utilised to identify Designated Sites which could feasibly be affected by the Proposed Wind Farm. All Designated Sites that could potentially be affected were identified using a source-pathway-receptor model. To provide context for the assessment, Designated Sites surrounding the Proposed Wind Farm Site are shown on Figure 8-7 and Figure 8-8.
- Waterbody catchment mapping was used to establish or discount potential hydrological connectivity between the Proposed Wind Farm and any designated sites. The hydrological catchments are also shown in Chapter 10 Hydrology and Water Quality.

8.5.2.2 Flora and Fauna

A desk study covering flora and fauna was undertaken to collate and review available information, datasets and documentation sources pertaining to the natural environment in which the proposed project is situated.

Records available on the NPWS and the National Biodiversity Data Centre (NBDC) websites were reviewed (search updated 13th May 2025), in addition to records of rare/sensitive species within the hectads (10km grid squares) overlapping the Site obtained by request from NPWS (received 10th April 2024). Records were also investigated at a finer spatial scale by searching within the following 2 km grid squares overlapping the and adjoining the Proposed Wind Farm: N73N, N73I, N73T, N73P, N73M, N73H, N73G, N73B and N73U (most recent search completed 13th May 2025).

NBDC data for the 1 km grid squares overlapping the TDR accommodation works (N7640, N7135, N7134, N7234, N7333, N7437, N7438 and N7538) (search updated 13th May 2025) provided desktop information for these locations.

Botanical species were assessed in accordance with their occurrence on the Flora Protection Order 2022 and the '*Ireland Red List No. 10: Vascular Plants*' (Wyse *et al*., 2016).

Other sources included:

- Kildare County Development Plan 2023-2029
- OSI Aerial photography and 1:50000 mapping;
- NPWS website (mapviewer; Article 17 reporting; FPO Bryophyte viewer)
- NPWS rare and protected species records obtained by request on 10th April 2024;
- National Biodiversity Data Centre (NBDC) website and data obtained on 13th May 2025;
- Teagasc Soil area maps;
- Geological Survey Ireland (GSI) area maps;
- OPW drainage maps;
- EPA website datasets (soil, surface water quality, ground water quality, designated sites);
- IFI website & guidance documents;
- Botanical Society of Britain and Ireland online maps and data.

8.5.2.3 Bats

A desk-based review of habitat availability in the environs of the Proposed Wind Farm and the available bat data was used to inform the scope of the bat surveys required. As recommended by both BCI (2012), SNH (2021) and NIEA (2021), the area covered by the desk-based review was extended to 10 km surrounding the Site. Data covering the GCR was also obtained. The desk-based study included:

- Reviewing distances from closest European Sites designated for bats (the only bat SACs in Ireland are designated for lesser horseshoe bat *Rhinolophus hipposideros*).
- Examining aerial imagery and 6-inch maps to identify potential bat foraging and roosting habitats.
- Lundy et al. (2011) provides a high-level assessment of potential habitat suitability for different species of bat occurring in Ireland.
- Review of data received from BCI within 10 km of the wind farm Site and the results of Biodiversity Maps report for the 10-km grid square covering the Site and GCR (N73) including species recorded and known roosting Sites.

8.5.3 Field Study

8.5.3.1 Habitats

Detailed botanical surveys and habitat classification for the areas containing the Proposed Wind Farm were completed. These surveys were completed during 19 - 21 September 2023, with additional follow-up surveys on 3 April and 30 September 2024.

The methodology used during this survey was based on the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (2011) and CIEEM 'Good Practice Guidance for Habitats and Species' Version 3 May 2021.

The classification of habitats recorded during the field survey is based on the 'A Guide to Habitats in Ireland' (Fossitt, 2000). Any other records of interest (e.g., invasive plant species) were also marked on field maps and locations were recorded using GPS handheld units. All species present were identifiable during the survey. Plant nomenclature for vascular plants follows 'New Flora of the British Isles' (Stace, 2019), while mosses and liverworts nomenclature follows 'Mosses and Liverworts of Britain and Ireland - a field guide' (British Bryological Society, 2010).

The Interpretation Manual of European Union Habitats [EUR28] and Article 17 reports were used to evaluate potential links with Annex I habitats.

During habitat surveys, a search for non-native invasive plant species was undertaken. The survey focused primarily on the identification of invasive species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (As Amended).

Once the baseline ecological survey and mapping was complete, a constraints map highlighting important ecological features and resources was generated. The ecological constraints map was used to design a wind farm layout with the least ecological impact.

In addition to habitat identification, each habitat was assessed for its ecological significance, based on the NRA Guidelines for Ecological Impact Assessment of National Road Projects (NRA, 2009), see Section 8.6 and Appendix 8.1-2.

Habitat boundaries and associated attribute data were mapped using desk-based GIS software, namely ArcGIS 10.4.1, which was also used to calculate habitat areas and lengths.

8.5.3.2 Mammals

Mammal surveys of the Proposed Wind Farm were undertaken on 13th/14th February, 6th/20th March and 3rd April 2024. Mammal surveys covering the entire development footprint and surrounding suitable habitats within 200m of turbine locations, 150m of bat felling buffers as applicable and within 150m of all other infrastructure were undertaken to determine the presence or absence protected mammal species in close proximity to the development footprint and TDR.

Sightings, tracks or signs (including droppings, resting places, burrows and setts) of mammals occurring within, or in the vicinity, of the development footprint were recorded using tablets running a customised Arc FieldMaps system and subsequently collated to produce maps using ArcGIS.

The mammal survey also included a drey search. Trees were also examined for their potential to host dreys.

Trail camera surveys focusing on badger setts and potential otter holts were also completed, under licence No. 058/2024.

Surveys were undertaken in accordance with the NRA's (2009b) '*Ecological Surveying Techniques for Protected Flora and Fauna During the Planning of National Road Schemes*' and the JNCC's (2004) '*Common Standards Monitoring Guidance for Mammals*'. Regard was also had to the following:

- Harris S, Cresswell P and Jefferies D (1989) Surveying Badgers, Mammal Society.
- O'Mahony D, O'Reilly C and Turner P (2006). National Pine Marten Survey of Ireland 2005.
- Gurnell J and Pepper H (1994) Red squirrel conservation: Field study methods. Research Information Note 255. Forestry Commission, Edinburgh.

- Reid N, Harrison AT and Robb GN (2009) Northern Ireland Irish hare survey 2009. Northern Ireland Environment Agency Research and Development Series No. 09/04.
- Morris PA (2006) The New Hedgehog Book. Whittet Book, Stowmarket

8.5.3.3 Otter

Dedicated otter surveys were undertaken by Triturus Environmental Ltd. in 2022 and 2023. Baseline surveys in October 2022 and October 2023 aimed to update previous findings and provide contemporary records of otter distribution, identifying signs such as holts, spraints, couches, prints, and others. Additional targeted otter surveys were undertaken by FT ecologists during 2024.

Walkover surveys of aquatic habitats near the Proposed Wind Farm were conducted during October 2022 and 2023. The survey area covered sections of the Fear English River, Kilcooney River, Sweep River, and adjoining drainage channels, totalling 6.9km. As such, all watercourses within 150m of proposed works were covered by the survey, in addition to the river network extending beyond the 150m survey buffer thereby exceeding survey requirements and obtaining data on otter usage of the river network in the surrounding catchment.

Each otter sign encountered, such as spraints (droppings), was logged by type, location using GPS, condition, and approximate age. The frequency of otter marking and the number of sprainting sites were noted to assess habitat use and activity levels.

Total Corridor Otter Survey (TCOS) was employed. This involved surveying the entire riparian zone (both banks) of watercourses within the survey area. Surveyors worked independently along each bank, with one surveyor in the channel and another on the bank. This method increased the likelihood of detecting otter signs, especially cryptic signs like holts, by accessing areas typically not visible in traditional surveys.

It is further noted that the general mammal survey extending to 150m from all proposed works locations also examined all suitable drains within the survey area to search for holts and otter signs.

See Appendix 8.1-3 for the otter survey baseline report.

8.5.3.4 Bat Surveys

Bat surveys were completed within the study area (Proposed Wind Farm footprint plus 300m turbine buffer) during 2022 - 2024. The surveys encompassed activity surveys (transects), static detector surveys, preliminary roost assessments, summer and winter roost surveys. The bat report is included in Appendix 8.1-4.

These surveys followed the specific guidelines set out by the Bat Conservation Trust in Bat Surveys: Good Practice Guidelines (Hundt, 2012 and Collins, 2016 & 2023). The locations of static detectors and methodology for static detector surveys followed the requirements of ‘Bats and Onshore Wind Turbines: Survey, Assessment and Mitigation’ (SNH, 2019; NatureScot 2021) and 'Guidance on Bat Surveys, Assessment and Mitigation for Onshore Wind Turbine Developments in Northern Ireland' (NIEA, Natural Environment Division, 2021) (updated April 2024).

Table 8-2: Bat Survey Schedule/Overview 2022 - 2024

Survey Type	Survey Date	Surveyor
Static Detector Survey	2022 Activity Season	Analysed by FT
Static Detector Survey	2023 Activity Season	Analysed by FT
Activity Survey 1	28/07/2022	Tom O'Donnell
Activity Survey 2	29/08/2022	Tom O'Donnell
Activity Survey 3	30/05/2023	Chandra Walter FT
Activity Survey 4	08/08/2023	Chandra Walter FT
Activity Survey 5	20/09/2023	Chandra Walter FT
Roost Survey 1	28-29/07/2022	Tom O'Donnell
Roost Survey 2	20/06/2023	David Daly/ Chandra Walter FT
Roost Survey 3	06/03/2024 & 20/03/2024 & 03/04/2024	Ben O'Dwyer FT
Roost Survey 4 (TDR)	30/09/2024 & 22/10/2024	Ben O'Dwyer FT

8.5.3.4.1 Bat Activity Surveys

The schedule of site surveys is shown in Table 2-1 in Appendix 8.1-4; all transects were walked during suitable weather conditions. Bat detectors used for recording bat activity during transect surveys; Wildlife Acoustics Echo Meter Touch pro (full spectrum) was used for activity surveys in 2022 and Elekon's Batlogger M2 was used for activity surveys in 2023. Recorded bat activity was manually analysed using Wildlife Acoustics Kaleidoscope Viewer Pro, specialist bat call analysis software and BatExploer Version 2.1.11.2.

Pipistrelle calls with an 'in-between' frequency of maximum energy, FMAXE, of c. 50kHz, cannot always be reliably assigned to either common pipistrelle (typical FMAXE of c. 45kHz) or Soprano Pipistrelle (typical FMAXE c. 55kHz), and were classified as 'Pipistrellus Sp.'. The echolocation pulses of *Myotis* sp. (Daubenton's bat, Natterer's bat, whiskered bat) can be difficult to separate to species due to similarities in call types, particularly if the pulses recorded are faint, only partially detected, or atypical. Where ambiguous, these were classified as *Myotis* sp.

Walked transect routes are shown in Figure 8-1 and Figure 8-2**.**. Bat activity was recorded along transects in July and August 2022 and in May, August and September 2023, with transects covered at dates as shown in Table 2-1. Bat activity was recorded along both the outgoing walked transect and the return walked transect where the outwards walk was not done before sunset. The transects were sampled in a random order in the hours after sunset, finishing no more than 3 hours after sunset.

Bat activity is governed by the activity of their insect prey and insect abundance is in turn governed by weather conditions and climate. Insects, and therefore bats, are unlikely to be present at temperatures below 6°C or during periods of strong winds or heavy rainfall so survey in such conditions is not possible. All field surveys were undertaken within the active bat season and during good weather conditions (dry conditions and optimal temperature >/= 10°C / minimum temperature >/= 7°C) (Collins 2023).

Nocturnal bat activity is mainly bi-modal taking advantage of increased insect numbers on the wing in the periods after dusk and before dawn, with a lull in activity in the middle of the night. This is particularly true of 'hawking' species – i.e. bats which capture prey in the open air. However, 'gleaning' species remain active throughout the night as prey is available on foliage for longer periods. Gleaning is the term for taking prey from foliage or the ground.

The activity transects surveyed sampled the habitats present in and adjacent to the Proposed Wind Farm and Substation, while focusing on the areas in which proposed turbines are located (see Figure 8-1, Figure 8-2 and Appendix 8.1-4).

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Legend

Proposed Development Boundary

Transects

- TR1
- TR1a
- TR2
- TR2a
- TR3
- TR3a

TITLE:	Bat Activity Survey Transect Routes Summer 2023		
PROJECT:	Drehid Wind Farm and Substation		
FIGURE NO:	8.1		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:20,000	**REVISION:**	0
DATE:	01/05/2025	**PAGE SIZE:**	A3

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Legend

- Proposed Development Boundary

Transects

- A
- B
- C
- D1
- D2

N
W E
S

0 0.5 1 2 Kilometers

TITLE:	Bat Activity Survey Transect Routes Summer 2022		
PROJECT:	Drehid Wind Farm and Substation		
FIGURE NO:	8.2		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:20,000	**REVISION:**	0
DATE:	01/05/2025	**PAGE SIZE:**	A3

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8.5.3.4.2 Static Detector Surveys

Passive Static Bat Surveys involve leaving a static bat detector unit (with ultrasonic microphone) in a specific location and set to record for a specified round of time (i.e., a bat detector is left in the field, there is no observer present and bats which pass the monitoring unit are recorded and their calls are stored for analysis post surveying). The bat detector is effectively used as a bat activity data logger. This results in a far greater sampling effort over the bat activity season. Bat detectors with ultrasonic microphones are used as the ultrasonic calls produced by bats cannot be heard by human hearing.

Song Meter SM4BAT Full Spectrum bat recorders use Real Time recording as a technique to record bat echolocation calls and using specific software, the recorded calls are identified. It is these sonograms (2-d sound pictures) that are digitally stored on the SD card (or micro SD cards depending on the model) and downloaded for analysis. Full spectrum bat recorders were utilised for all the static surveys as recommended in the revised SNH (2021) guidelines. These results are depicted on a graph showing the number of bat passes per species per hour/night. Each bat pass does not correlate to an individual bat but is representative of bat activity levels. Some species such as the pipistrelles will continuously fly around a habitat and therefore it is likely that a series of bat passes within a similar time frame is one individual bat. On the other hand, Leisler's bats tend to travel through an area quickly and therefore an individual sequence or bat pass is more likely to be indicative of individual bats.

As per NatureScot 2021 guidance, static units (Song Meter SM4BAT) were programmed to commence half an hour before sunset and finish half an hour after sunrise to ensure that bat species that emerge early in the evening and return to roosts late are recorded. Detectors were left out for a minimum of 10 consecutive nights across three survey rounds: spring (April-May), summer (June-mid-August) and autumn (mid-August-October) during both 2022 and 2023. To account for nights with unsuitable weather conditions, detectors were deployed longer than the minimum required 10 consecutive nights (SNH, 2021) to ensure sufficient data was gathered during suitable weather conditions.

NatureScot (2021) guidance states that "*Detectors should be placed at all known turbine locations at wind farms containing less than ten proposed turbines. Where developments have more than ten turbines, detectors should be placed within the developable area at ten potential turbine locations plus a third of additional potential turbine sites up to a maximum of 40 detectors for the largest developments*".

A total of 11 detectors were deployed to cover all 11 potential turbine locations for all survey rounds in 2023. The detectors were placed at or close to proposed turbine locations in analogous habitats (see Figure 8-3 and Table 8-4: Static Detector Locations 2023 for distances to turbine locations). For T8, the detectors were deployed in nearby edge habitat which is representative of the situation of T8 both pre and post-construction (wooded habitat with open bog nearby. For T10, the detectors were deployed to analogous habitat (conifer plantation).

Static detector surveys in 2022 covered a total of 11 locations, some of which overlapped closely with proposed turbine locations, and others which were further from turbines and in some cases covered two turbine locations, lying roughly halfway between two turbines (see Table 8-5 and Table 8-5: Static Detector Locations 2022). It is noted that DR04 and DR05 were placed to survey two turbine locations which have since been removed/relocated, rendering these locations more useful in detecting activity at the site scale rather than for specific turbine locations. DR05 can be approximately equated to T4 based on analogous habitat. As a result of the relocation/ removal of proposed turbine locations between 2022 and 2023 surveys and subsequent re-numbering of turbine locations, DR01 and DR02 relate to the areas where T1, T2 and T3 are located (DR02 relates more closely to T3 than T2, both in terms of distance and habitat similarity). DR04 is not located in the vicinity of any current turbine locations, and as such is representative of bog woodland edge habitat. The closest proposed turbine to DR05 is T4. DR06 is located in the vicinity of T5. Both DR07 and DR08 are located in the vicinity of T6. The closest proposed turbine to DR09 is T8. DR10 covers the area for T9. DR11 is not in the vicinity of any proposed turbine locations; however, it is located on conifer plantation edge which is representative habitat for T10. DR12 is located near T11.

The locations of the static detectors are presented in Figure 8-3 and Figure 8-4 below.

The data was analysed with Kaleidoscope 5.3.9g software (Bats of Europe 5.2.1).

Table 8-3: Static Detector Locations 2023

Detector Location	Distance to Turbine	Fossitt habitats at deployment location(s)	Fossitt habitats at turbine location	Dates Deployed
T1	72m	WL1/WL2 Mosaic, GA1	WL1/WL2 Mosaic, GA1	R1: 22/05/23 - 20/06/23 R2: 08/08/23 - 30/08/23 R3: 20/09/23 - 23/10/23
T2	47m	WL1/WL2 Mosaic, GA1	WL1/WL2 Mosaic, GA1	R1: 22/05/23 - 20/06/23 R2: 08/08/23 - 30/08/23 R3: 20/09/23 - 24/10/23
T3	88m	WL1/WL2 Mosaic, GA1 (GA1 now converted to BC3 -precursor to BC1)	GA1 (GA1 now converted to BC3 -precursor to BC1)	R1: 22/05/23 - 20/06/23 R2: 13/08/23 - 30/08/23 R3: 20/09/23 - 24/10/23
T4	31m	WL1/WL2 Mosaic, GA1	WL1/WL2 Mosaic, GA1	R1: 22/05/23 - 20/06/23 R2: 08/08/23 - 30/08/23 R3: 20/09/23 - 24/10/23
T5	14m	WL1/WL2 Mosaic, GA1	WL1/WL2 Mosaic, GA1	R1: 22/05/23 - 20/06/23 R2: 08/08/23 - 30/08/23 R3: 20/09/23 - 24/10/23
T6	14m	WD4	WD4	R1: 22/05/23 - 20/06/23 R2: 08/08/23 - 30/08/23 R3: 19/09/23 - 23/10/23
T7	16m	WD2	WD2	R1: 22/05/23 - 20/06/23 R2: 08/08/23 - 30/08/23 R3: 19/09/23 - 23/10/23
T8	23m	WS1/PB1 Mosaic, PF1/PF2 Mosaic	WN7	R1: 22/05/23 - 20/06/23 R2: 08/08/23 - 30/08/23 R3: 19/09/23 - 23/10/23
T9	86m	WD4/ED2	WD4	R1: 22/05/23 - 20/06/23 R2: 08/08/23 - 30/08/23 R3: 05/10/23 - 23/10/23
T10	182m	WD4	WD4	R1: 22/05/23 - 20/06/23 R2: 08/08/23 - 30/08/23 R3: 19/09/23 - 23/10/23
T11	1m	WD4	WD4	R1: 22/05/23 - 20/06/23 R2: 08/08/23 - 30/08/23 R3: 19/09/23 - 24/10/23

Table 8-4: Static Detector Locations 2022

Detector Location	Turbine/ Distance	Fossitt habitats at deployment location	Fossitt habitats at turbine location	Dates Deployed
DR01	T1/8m	WL1/WL2 Mosaic, GA1	WL1/WL2 Mosaic, GA1	R1: 09/05/22 - 23/05/22 R2: 22/06/22 - 02/08/22 R3: 16/08/22 - 06/09/22
DR02	T2/362m T3/214m	GA1/BC3 (BC3 -precursor to BC1)	WL1/WL2 Mosaic, GA1 (T2) GA1 (Now BC3) (T3)	R1: 09/05/22 - 23/05/22 R2: 22/06/22 - 30/07/22 R3: 16/08/22 - 07/09/22
DR04	T3/559m	GA1/WN7	GA1	R1: 09/05/22 - 23/05/22 R2: 22/06/22 - 13/07/22 R3: 29/08/22 - 20/09/22
DR05	T4/235m	WL1,GA1	WL1/WL2 Mosaic, GA1	R1: 09/05/22 - 23/05/22 R2: 22/06/22 - 13/07/22 R3: 16/08/22 - 22/09/22
DR06	T5/156m	WL1/WL2 Mosaic, GA1	WL1/WL2 Mosaic, GA1	R1: 09/05/22 - 23/05/22 R2: 22/06/22 - 30/07/22 R3: 16/08/22 - 22/09/22
DR07	T6/80m	WD4	WD4	R1: 09/05/22 - 23/05/22 R2: 22/06/22 - 13/07/22 R3: 16/08/22 - 07/09/22
DR08	T6/118m	WD4,GA1,ED2	WD4	R1: 09/05/22 - 23/05/22 R2: 22/06/22 - 29/06/22 & 13/07/22 - 27/07/22 R3: : 16/08/22 - 07/09/22
DR09	T8/274m	WS1/PB1	WD2 (T7) WN7 (T8)	R1: 10/05/22 - 23/05/22 R2: 22/06/22 - 13/07/22 R3: : 19/08/22 - 07/09/22
DR10	T9/87m	WD4	WD4	R1: 10/05/22 - 23/05/22 R2: 22/06/22 - 13/07/22 R3: 16/08/22 - 07/09/22
DR11	T10/ 405m	WD4	WD4 (T9) WD4 (T10)	R1: 10/05/22 - 23/05/22 R2: 22/06/22 - 13/07/22 R3: 16/08/22 - 07/09/22
DR12	T11/30m	WD4	WD4	R1: 09/05/22 - 23/05/22 R2: 13/07/22 - 28/07/22 R3: 16/08/22 - 07/09/22

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Legend

- Proposed Development Boundary
- Static Detectors
- Turbine Locations

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TITLE:	Static Detector Locations 2023		
PROJECT:	Drehid Wind Farm and Substation		
FIGURE NO:	8.3		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:20,000	**REVISION:**	0
DATE:	01/05/2025	**PAGE SIZE:**	A3

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Legend

- Proposed Development Boundary
- Static Detectors
- Turbine Locations

TITLE:	Static Detector Locations 2022		
PROJECT:	Drehid Wind Farm and Substation		
FIGURE NO:	8.4		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:20,000	**REVISION:**	0
DATE:	01/05/2025	**PAGE SIZE:**	A3

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Data Analysis

All recordings were made in full spectrum, retaining all amplitude and harmonic information from the original bat call for subsequent analysis. Bat calls were analysed using Kaleidoscope Pro (5.3.9) Software. All files were split to a maximum duration of 15 seconds and automatically identified to species level, or genus level as appropriate, using auto-ID bat classifiers (Bats of Europe 5.2.1).

For the data from 2022 static detector surveys, Kaleidoscope Pro (5.3.9) Software auto-ID was used as per industry standard.

Static detector data was manually verified in order to provide an additional layer of quality assurance. Files with pulse matches of 3 or less , as well as a match ratio of 70% or less were manually checked as well as all NoID files and a minimum 10% of Noise files. All files with auto-ID for Nathusius' pippistrelle and brown long eared bat were manually checked, as they are often misidentified by Kaleidoscope Pro (5.3.9).

8.5.3.4.3 Roost Surveys

Searches for potential roosting features (PRFs) were conducted during summer 2022, summer 2023 and winter/spring/autumn 2024. Habitats and features with potential to contain bat roosting features were searched for and examined. This included preliminary roost assessment (PRA) for structures and ground-level tree assessment (GLTA) conducted in accordance with Collins (2023) and SNH (2019).

The core survey area was 300m around proposed turbines, which exceeds the requirement set out in SNH (2019; 2021) and NIEA Guidelines (Version 1.1) (2024) of 200m plus rotor radius (265m). A GLTA survey focused on trees potentially affected by the TDR and PRA encompassing the northern site access route were also conducted in September 2024.

Searches were conducted across both summer and winter seasons. Summer surveys focused on a preliminary assessment of potential for trees in areas around proposed turbines to host PRFs, and PRA of farms to the south and south-west of T4/T5 (outside 300m core survey area). All structures potentially suitable for bats within the survey area were surveyed. Bat boxes in the northern part of the site were also checked. The surveys encompassed checks of PRFs previously identified in 2018 surveys which are within the potential ZoI of the current layout.

Ground-level assessment of trees was carried out during the winter season/early spring when the absence of leaves gives optimal visibility of trees allowing detection of PRFs from the ground. This survey included ground-level checks of trees with PRFs and bat boxes recorded during previous surveys to confirm their presence, in addition to full ground-level resurvey of trees within the 300m turbine survey area and any trees which could potentially be affected by other elements of the projects (i.e. substation, access roads).

The schedule for 2022-2024 roost surveys is detailed in Table 8-5 below.

Table 8-5: Roost survey schedule

Date	Survey	Weather	Surveyor
PRA	28/07/2022	Dry; visibility excellent	Tom O'Donell
PRA	29/07/2022	Dry; visibility excellent	Tom O'Donell
PRA	20/06/2023	Dry; 50% cloud cover; F2; visibility excellent	David Daly
Preliminary GLTA	20/06/2023	Dry; 50% cloud cover; F2; visibility excellent	David Daly Chandra Walter
Bat Box Checks	20/06/2023	Dry; 50% cloud cover; F2; visibility excellent	Chandra Walter
Bat Box Checks	06/03/2024	Dry; 75% cloud cover; F1; visibility excellent	Ben O'Dwyer
GLTA	06/03/2024	Dry; 75% cloud cover; F1; visibility excellent	Ben O'Dwyer
GLTA	20/03/2024	Dry; 87% cloud cover; F2; visibility excellent	Ben O'Dwyer
GLTA	03/04/2024	Dry; 100% cloud cover; F3; visibility excellent	Ben O'Dwyer
GLTA/PRA	30/09/2024	Dry; 100% cloud cover; F2; visibility excellent	Ben O'Dwyer
PRA (TDR)	22/10/2024	Dry; 50% cloud cover; F1; visibility excellent	Ben O'Dwyer

Visual Survey for Potential Roost Sites (Buildings/Structures)

Visual inspections of structures were assisted with high powered directional torchlight, close-focusing binoculars, and an endoscope as needed. The interior (where possible) and exterior of potential roost structures were undertaken during the hours of daylight, searching for signs of bat roosting, including for example;

- Bats, dead or alive
- Bat droppings: these can accumulate under established roosting and access locations.
- Feeding remains: discarded insects parts such as moth wings under feeding perches.
- Fur oil/grease staining: natural oils in bats' fur rubs onto regularly used surfaces.
- Urine staining, or splashes on windows.
- Scratch marks: from bats movements in and out of perching/roosting locations.

- Lack of spider webs in holes and crevices: may indicate bats passing.
- Characteristic smells of bats may sometimes be detectable.
- Audible daytime roost bat chatter.

Potential roost sites were categorised with respect to their potential roosting suitability to bats (negligible, low, moderate, high) according to Collins, J. (ed) (2023) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edn.) The Bat Conservation Trust, London.

Wherever a bat lives or rests is a bat roost. However bats need different roosting conditions at different times of the year, and they will often move around to find a roost that meets their needs. Summer maternity roosts, where females gather to give birth and rear pups, are of greater conservation significance than a night roost or an occasional roost used by a single or small number of bats. This survey also aimed to establish the type of roosts present, if any, using the roost definitions Collins (2023) bat survey guidelines.

Visual survey for Potential Roost Sites in Trees

Potential tree roosts were surveyed from ground level with a torch and binoculars, searching for the presence of bats or bat evidence, and any Potential Roost Features (i.e. PRFs) identified by the Bat Tree Habitat Key Project (Andrews & BTHK 2020), such as rot holes, hazard beams, frost cracks and splits, partially detached bark, knot holes, tear outs, gaps between overlapping branches, and woodpecker holes. When assessing the suitability of a particular PRF to hold bats, a sliding scale of potentiality from low, through moderate, and up into high is sometimes used as recommended by Collins (2023) guidelines, but this is subjective between surveyors. Bats sometimes roost in very inconspicuous tree roosts (Andrews & BTHK 2020) and can be there one day and not the next. Leisler's bat are the Irish bat species for which the most tree roosts have been identified (Roche et al. 2014), and this species roosted an average of 19 m from the ground in tree roosts in a study in Poland for example (Ruczyński & Bogdanowicz 2005). A basic ground level search for PRFs is therefore a survey constraint.

8.5.3.5 Marsh Fritillary Surveys

Areas of potentially suitable habitat within and adjacent the Proposed Wind Farm were surveyed for marsh fritillary butterfly (*Euphydryas aurinia*) during 18th - 19th September 2022. Searches of potentially suitable habitat for the larval foodplant of marsh fritillary - devil's-bit scabious (*Succisa pratensis*) were conducted initially, followed by larval web searches targeting areas identified as being suitable for this species. The marsh fritillary surveys in 2022 were completed Dr. Ken Bond (UCC). See Appendix 8.1-5 for further details.

A follow-up survey covering the same areas of suitable habitat identified in 2022 was completed by FT ecologists during 21st and 25th September 2023. Searches to locate areas of devil's-bit scabious and potentially suitable habitat were repeated, and suitable areas were then searched for larval webs.

The surveys were undertaken within the optimal period for undertaking marsh fritillary larval web surveys, i.e. August – September, on dry days, with no rain and little or no wind. The survey methodology followed that described in the NRA (2009) best practice guidance document and Marsh Fritillary Butterfly Surveys NIEA Specific Requirements (NIEA, 2017).

8.5.3.6 Lizard Surveys

Lizard surveys were undertaken in 2021, 2022 and 2023. The survey in 2021 focused on a previous (now defunct) substation location, and the proposed grid connection route (which remains approximately the same). The 2022 survey focused on turbine locations in potentially suitable habitat, while the 2023 survey entailed a walkover of areas of potentially suitable habitat at the Proposed Wind Farm and Substation, and checks to confirm any changes in baseline habitat conditions.

8.5.3.6.1 Directed visual transects

Following best practice guidance, in addition to artificial cover object (ACO) refugia surveys, directed visual transects were also conducted during the May-September 2021 and April-June 2022 survey periods (see Appendix 8.1-6 for survey dates) to maximise the likelihood of basking or foraging lizard detection outside of the ACO areas. Transects were completed by surveyors moving between ACO clusters, typically along forestry access tracks but also across raised bog, coniferous plantation and improved agricultural grassland habitats (Figures 2.1 & 2.2 in Appendix 8.1-6). In total, approx. 4km of linear habitat was surveyed via directed visual transects.

Directed visual transects were again conducted during suitable conditions (dry and sunny, mid-morning to early afternoon) on September 19 2023. This survey targeted potentially suitable lizard habitat within and near the Proposed Wind Farm, focusing primarily on potential basking features. Potential refugia features were also inspected opportunistically when encountered. Transects surveyed in 2023 are shown in Figure 8-5. These covered forestry access tracks, raised bog, coniferous plantation (various stages) and recently felled woodland.

8.5.3.6.2 Refugia searching (including ACOs)

Presence / absence surveys for common lizard were undertaken in two areas covering the previous (2021) substation location and previous (2021) grid connection (2021 grid connection survey area overlaps current proposed grid connection) in May-June 2021 (survey area A, 8 no. site visits) and August-September 2021 (survey area B, 5 no. site visits) (Figure 2.1; Table 2.1 in Appendix 8.1-6). Further surveys were undertaken in April-June 2022 (6 no. site visits) in the vicinity of proposed turbine locations T7, T9, T10 & T12 where lizards had previously been observed (Triturus, 2019) and which align with the occurrence of suitable habitat at the proposed development (see Figure 2.1 and Table 2.1 in Appendix 8.1-6).

Given the discrepancies and spatial variation between natural (pre-existing) refugia sites within the survey areas, artificial cover objects (ACOs) were utilised to survey for lizards (as per Triturus, 2019). These were placed strategically within the vicinity of the proposed substation/grid cable route (GCR) (2021) and turbines T7, T9, T10 & T12 (2022), located in the northern extent of the wind farm site (Figures 2.1, 2.2 in Appendix 8.1-6). Black bitumen roofing felt mats (hereafter felt mats) were used given their known acceptance by lizards as both basking and refugia sites (Triturus, 2019; Fish, 2016; Beebee, 2013). All felt ACOs measured ≥0.5m2 in area following best practice guidelines (e.g. Sewell et al., 2013; NRA, 2009). ACOs were placed at the equivalent density of ≥10 per hectare (i.e. 100 x 100m area) in suitable areas of habitat in the vicinity of the survey areas (as recommended by NRA, 2009). This equated to a total of n=92 ACOs deployed throughout the study area in 2021 (n=39) and 2022 (n=53), respectively.

ACOs were positioned in various habitat types including clear-fell brash (WS5; Fossitt, 2000), coniferous forestry (WD4), immature woodland (WS2), bog woodland (WN7) and degraded raised bog (PB1). To maximise the likelihood of adoption by common lizard, ACO sites were chosen to be south-facing (i.e. greater thigmothermal properties) and adjoining suitable vegetation or other structural cover likely to be favoured by common lizards.

Data on site-specific factors thought to be potentially relevant for site occupancy and lizard detection rates, such as soil type, vegetation type and cover, adjoining habitats, habitat connectivity, weather conditions, air temperature, cloud cover, orientation and relative human disturbance levels, were collected to elucidate the most appropriate survey conditions over time (as per Sewell et al., 2012). Where possible, site visits were undertaken on bright, sunny mornings (8-11am period) or when later sunshine followed a period of rainfall or cold / dull conditions. This approach helped to maximise the likelihood of observing basking lizards on ACOs. Each ACO cluster and individual ACO site were visited at least a total of six times throughout the study period, (Table 2.1 in Appendix 8.1-6). This far exceeded the minimum number of visits (three) required to determine common lizard presence with 95% confidence (Sewell et al., 2012).

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- Proposed Development Boundary
- Lizard Survey Transects

TITLE:	Lizard Survey Transect Routes 2023		
PROJECT:	Drehid Wind Farm and Substation		
FIGURE NO:	8.5		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:20,000	**REVISION:**	0
DATE:	07/04/2025	**PAGE SIZE:**	A3

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8.5.3.7 Aquatic Ecology Surveys

Ecofact Environmental Consultants undertook aquatic ecology surveys of the proposed development. Their most recent report includes findings from a survey conducted in December 2023, which builds upon previous surveys conducted in 2018, 2019, and 2021. The assessment included all water bodies directly or indirectly affected by the Proposed Wind Farm. A total of 15 sites were selected for assessment (sites 1-10 ad sites A-D), providing baseline information and potential monitoring points during construction. These sites were chosen to evaluate biological water quality, fisheries value, aquatic habitat value, and the presence of rare/protected/notable aquatic species. Aquatic ecology baseline reports are included in Appendix 8.1-7.

During 2023 surveys, additional survey sites (Sites A-D) were added to target proposed crossing points along the Ballynamullagh section of the Fear English River. Site A is located at the furthest upstream proposed crossing location along the Ballynamullagh (adjacent to proposed site compound). Site B is located at the existing/proposed crossing point south of T3. Sites C and D were targeted to cover the section of the Ballynamullagh intersected by the proposed crossing between T4 and T7, with Site C located 76m upstream of this crossing and Site D located 170m downstream of this crossing.

While the previous assessment based on Sites 6 - 10 was determined by the aquatic ecologist to provide sufficient data for a robust assessment of any and all proposed crossing points along the Fear English River, the additional sites were added in 2023 to provide fine-grained location-specific information and pursue the precautionary principle to an ultra-conservative level.

Various techniques such as aquatic habitat evaluations, electrofishing for fish population studies, and kick sampling for biological water quality assessments were employed. Qualitative netting with a ‘D’ shaped dip net (35cm diameter, 2mm mesh) was carried out at selected sites to check for the presence / absence of small fish. The net was used in a circular motion to intercept small fish sheltering in instream vegetation stands and under the bank vegetation overhang. Habitat assessment was carried out at the rivers/streams on, and in the vicinity of, the site using the methodology given in the Environment Agency's 'River Habitat Survey in Britain and Ireland Field Survey Guidance Manual 2003' (EA, 2003) and the Irish Heritage Council's 'A Guide to Habitats in Ireland' (Fossitt, 2000). Qualitative sampling of benthic (or bottom dwelling) macroinvertebrates was undertaken at selected (index) sites using kick-sampling (Toner et al., 2005). Stone washing and vegetation sweeps were also undertaken to ensure a representative sample of the fauna present at each site was collected. The Quality Rating (Q) System (Toner et al., 2005) was used to obtain a water quality rating for each site. The selection of survey sites and methods received the approval of Inland Fisheries Ireland and the Department of the Environment, Climate, and Communications. This approval was granted under Section 14 of the Fisheries (Consolidation) Act of 1959.

Table 8-6: Aquatic Survey Sites (2018, 2019, 2021, and 2023)

Site No.	Catchment	Sub-catchment	Watercourse Name	Watercourse Order	EPA Segment Code
1	Boyne	Blackwater (Longwood)	Blackwater (Longwood)	3	07_1059
2	Boyne	Blackwater (Longwood)	Blackwater (Longwood)	3	07_2240
3	Boyne	Blackwater (Longwood)	Mulgeeth	2	07_1720
4	Boyne	Blackwater (Longwood)	Mulgeeth	2	07_1320
5	Boyne	Blackwater (Longwood)	Blackwater (Longwood)	4	07_350
6	Boyne	Blackwater (Longwood)	Coolree 07	3	07_1848
7	Boyne	Blackwater (Longwood)	Clonkeeran	1	07_1287
8	Boyne	Blackwater (Longwood)	Coolree 07	1	07_1230
9	Boyne	Blackwater (Longwood)	Ballynamullagh	1	07_801
10	Boyne	Blackwater (Longwood)	Drehid	1	07_800

Table 8-7: Additional Aquatic Survey Sites (2023)

Site No.	Catchment	Sub-catchment	Watercourse Name	Watercourse Order	EPA Segment Code
A	Boyne	Blackwater (Longwood)	Ballynamullagh	1	07_864
B	Boyne	Blackwater (Longwood)	Ballynamullagh	1	07_864
C	Boyne	Blackwater (Longwood)	Ballynamullagh	1	07_864
D	Boyne	Blackwater (Longwood)	Ballynamullagh	1	07_864
E	Boyne	Blackwater (Longwood)	Unnamed	n/a	n/a

Table 8-8: Aquatic Survey Sites targeting Proposed Watercourse Crossings (2023)

Watercourse Crossing	Watercourse Name	EPA Segment Code	Aquatic Survey Site (in-stream distance)
1	Ballynamullagh	07_864	A (located at crossing point) 9 (700m upstream of crossing point) 10 (655m upstream of crossing point)
2	Ballynamullagh	07_864	B (located at existing crossing point)
3	Ballynamullagh	07_864	C (76m upstream of crossing point)
3	Ballynamullagh	07_864	D (170m downstream of crossing point) 6 (2.7 km downstream of crossing point)

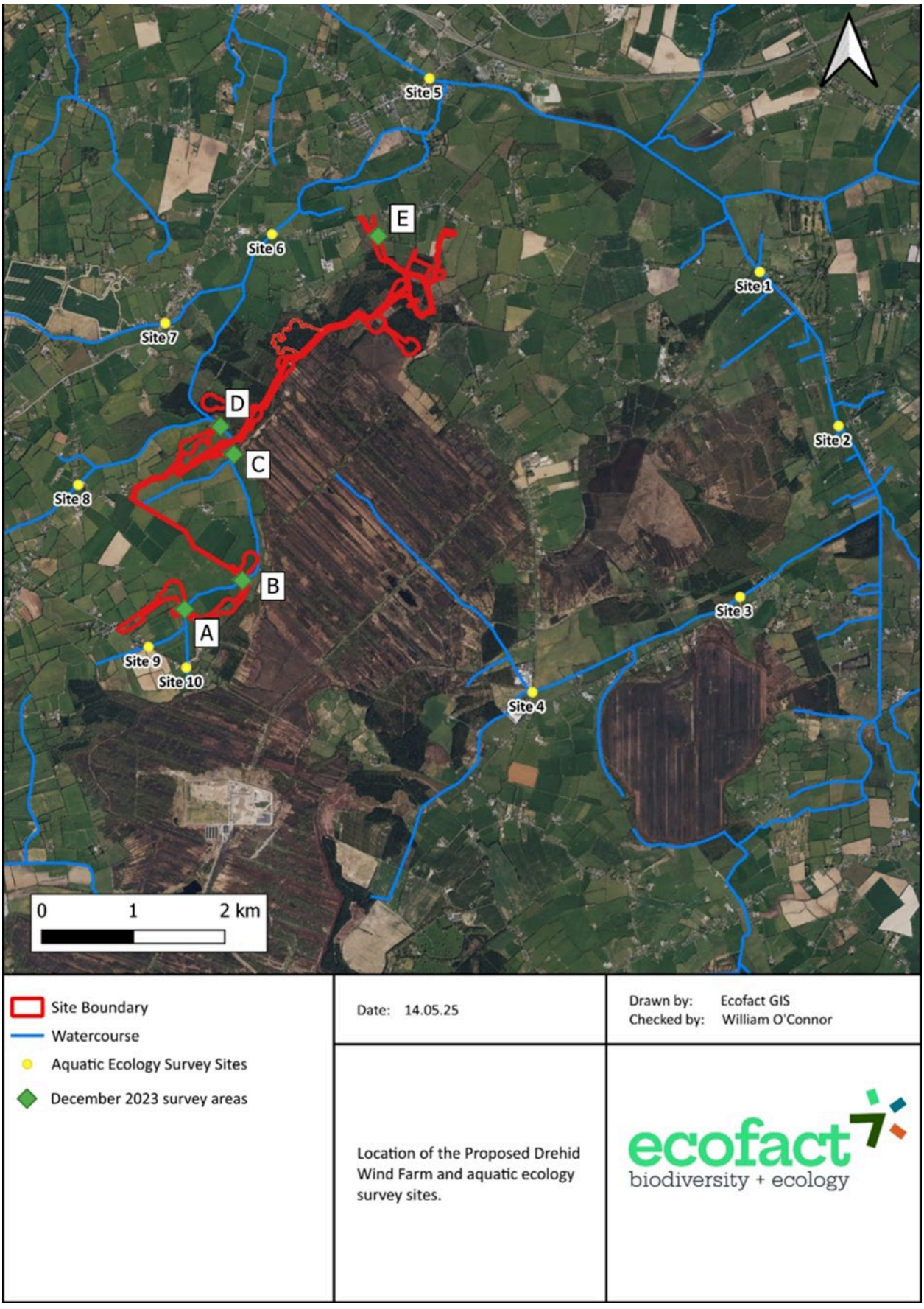

Figure 8-6: Aquatic Ecology Survey Sites

8.5.3.8 Other Species

Observations of other species and groups including amphibians and invertebrates were recorded during ecological walkovers of the Proposed Wind Farm site, and any incidental observations of other species made during surveys were recorded. Potentially suitable ponds and drains were surveyed for amphibians during ecological walkover surveys.

8.5.3.9 Survey Limitations

Some Irish bat species have much higher intensity of echolocation than others, and can thus be detected from greater distances, e.g. Leisler's bat (by far the loudest of all the Irish bat species), followed by relatively intense echolocation of common pipistrelle and soprano pipistrelle. Bat species with quieter echolocation, such as brown long-eared bat and Natterer's bat, must fly much closer to the microphone to be detected. Information taken from the UK Bat Conservation Trust's bat survey guidelines indicates that brown long-eared bat and Natterer's bat are among the most difficult to detect bat species. These differences in acoustic detectability are important for interpreting the results of passive detector monitoring.

It is not always possible to identify a bat call to species level due to the recorded call not being clear. Recorded files from automated detectors may contain only fragments of a call, or the bat may be calling from a distance (from the detector) in which case it may not be clear enough to assign the call to a specific species. In these cases, where manual verification was used, the call was assigned to genus level.

Some caution must be taken when comparing activity levels between species, as bias can be shown towards those species with ‘louder’ or ‘lower frequency’ echolocation calls. For example, Nyctalus species have louder and lower frequency echolocation calls which carry further than the quieter and more broad-band brown long-eared bat echolocation calls.

Brown long-eared bat is present on-site, but this species is very quiet and sometimes hunts without echolocating, so it may be under-recorded by the static detectors. However, the extent of surveys provides a robust baseline of bat species activity within the study area.

For the purposes of this analysis, if more than one species was present within the recorded file, Kaleidoscope chooses the prominent species to label the file. During manual verification, if a checked file contained calls from more than one species, the file was labelled as the rarest species in the recording file for the specific data set. Due to the way Kaleidoscope labels data, some species numbers may be under recorded. However with the extent of surveys a robust baseline of bat species within the study area is presented.

Activity transect surveys in 2022 were limited to two rounds, covering the summer and autumn windows. However, three rounds of activity surveys were undertaken in summer 2023, providing a robust baseline for assessment of bat activity at the proposed development site.

It is not considered that any of these survey specific constraints represent a significant limitation or data gap to adequately assessing the potential effects of the proposed development on bat species within and surrounding the site.

8.6 Ecological Resource Evaluation

The value of the ecological resources/receptors was evaluated using the ecological evaluation guidance given in the NRA guidance on assessment of ecological impacts of National Road Schemes (NRA, 2009a).

This guidance provides ratings for resources based primarily on geographic context and allows for resources at International, National, County and Local (higher and lower value) levels. Key ecological receptors (for assessment) are those deemed to be above the 'Local Importance (lower value) evaluation.

Ecological features are assessed on a scale ranging from international-national-county-local. The local scale is approximately equivalent to one 10 km square but can be operationally defined to reflect the character of the area of interest.

Habitats and species were evaluated following the NRA (2009a) criteria on the basis of a number of characteristics and features defined as follows:

- The fisheries value of a watercourse refers to its suitability for fish, primarily Salmonids (Salmon and Trout), and to the associated value for recreational angling purposes.
- Annex II species are those that are listed under the EU Habitats Directive (92/43/EEC).
- Annex I habitats are those that are listed under the EU Habitats Directive, including Priority Habitats.
- Species protected under the Wildlife Acts 1976-2022 and associated orders.
- The evaluation of water quality uses a five-point biotic index (Q-value) based on the presence and relative abundance of various invertebrates using the Environmental Protection Agency's (EPA) standard technique.

8.6.1 Assessing Effect Significance

Once the value of the identified ecological receptors (features and resources) was determined, the next step was to assess the potential effect or impact of the project on the identified key ecological receptors, following the EPA evaluation criteria utilised in this appraisal of the Environmental Factor, Biodiversity. This criteria is included in the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA 2022).

8.6.1.1 Assessment of Effect Type and Magnitude

Assessment of effects takes into account construction, operational and decommissioning effects with reference to the potential for direct, indirect and cumulative effects. The assessment also takes account of any residual effects that may persist following the implementation of any mitigation or best practice design.

The characterisation of effects reflects the ecological structure and function upon which the key ecological receptors depend. Detailed assessment of effects takes into account the magnitude of effects affecting populations.

This EIAR uses the EPA (2022) classification of effects in order to describe the quality, significance, duration and type of effect.

The ecological significance of the effects of the Proposed Wind Farm are determined following the precautionary principle and in accordance with the methodology set out in Section 5 of CIEEM Guidelines for Ecological Impact Assessment (2018).

For the purpose of Ecological Impact Assessment (EcIA), 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local (CIEEM, 2018).

When determining significance, consideration is given to whether:

- Any processes or key characteristics of key ecological receptors will be removed or changed
- There will be an effect on the nature, extent, structure and function of important ecological features
- There is an effect on the average population size and viability of ecologically important species.
- There is an effect on the conservation status of important ecological habitats and species.

8.6.1.2 Assessment of Cumulative Effects

Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location (CIEEM, 2018). Different types of actions can cause cumulative impacts and effects. As such, these types of impacts may be characterised as;

- Additive/incremental – in which multiple activities/projects (each with potentially insignificant effects) add together to contribute to a significant effect due to their proximity in time and space (CIEEM, 2018); and,
- Associated/connected – a development activity 'enables' another development activity e.g. phased development as part of separate planning applications. Associated developments may include different aspects of the project which may be authorised under different consent processes. It is important to assess the potential impacts of the 'project' as a whole and not ignore impacts that fall under a separate consent process (CIEEM, 2018).

8.6.1.3 Assessment of Residual Effects

After characterising the potential impacts of the Development, and assessing the potential effects of these impacts on the 'Important ecological features', mitigation measures are proposed to avoid and / or mitigate the identified ecological effects.

Once measures to avoid and mitigate ecological effects have been finalised, assessment of the residual impacts and effects should be undertaken to determine the significance of their effects on the 'Important ecological features'.

The tables and matrices used to inform ecological resource evaluation and effect significance assessment are included in Appendix 8.1-2.

8.7 Description of Existing Environment

The ecology of the existing environment is described within this section.

8.7.1 Defining the Zone of Influence

The potential zone of influence (ZoI) for the wind farm is defined by determining the potential for ecological connectivity based on hydrological and topographical characteristics, the particular characteristics of species, habitats and populations being assessed, and a description of the proposed project. As such, the ZoI is determined based on a description of the receiving environment and the potential sources for impacts to the receiving environment associated with the project being assessed.

The process of determining the likelihood of significant effects from a proposed development on European sites is an iterative process centred around a Source-Pathway-Receptor model. In order for an effect to be established, all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism is sufficient to conclude that a potential effect is not of any relevance or significance.

- Source(s) – e.g., pollutant run-off, noise, removal of vegetation, etc.;
- Pathway(s) – functional link, or ecological pathway e.g., groundwater connecting to nearby qualifying wetland habitats; and,
- Receptor(s) –the qualifying habitats and species of European sites and ecological resources supporting those habitats/species.

The zone of influence of a proposed development is the geographical area over which it could affect the receiving environment in a way that could have potential effects on the Qualifying Interests of a European site. The OPR (2021) practice note states that the Zone of Influence must be established on a case-by-case basis using the Source-Pathway-Receptor (S-P-R) framework.

Due to the short length of the grid connection (terminating at an existing high voltage overhead line c. 420m from the proposed onsite substation), the potential ZoI for the grid connection is encompassed by that of the Proposed Wind Farm.

The potential ZoI of the TDR is defined by a 500m buffer around the TDR Nodes. The 500m buffer for initial assessment is informed by the localised and small-scale nature of works required at TDR Nodes (vegetation trimming, placement of temporary load bearing surfaces and site entrance tree/hedgerow removal are the most invasive works required). The 500m buffer has also been selected as the ZoI for initial assessment this distance encompasses the buffering distances required for the most sensitive group (wetland and waterbirds) associated with designated sites.

The 500m buffer has been applied at all TDR Nodes for initial assessment to maintain a consistent approach. Any sites outside the 500m buffer with potential hydrological links or other ecological links such as mobile species are also within the potential ZoI of the TDR. The ZoI is then refined further based on the potential impacts associated with works at particular TDR Nodes and the conservation interests of individual sites. It is noted that due to the absence of designated sites and suitable waterbird habitats within 500m of TDR Nodes, access to the 500m buffer for surveys was not required and it was possible to visually assess all potential ecological receptors within the potential ZoI of TDR Nodes from public roads.

8.7.2 Designated Sites

8.7.2.1 Sites of International Importance

An Appropriate Assessment (AA) Screening Report and Natura Impact Statement (NIS) have been completed in order to appraise the likely significant effects of the Proposed Wind Farm either alone or in combination with other plans or projects on European Sites (SACs, cSACs, SPAs and proposed SPAs); these accompany this planning application.

8.7.2.1.1 Special Areas of Conservation (SACs)

SACs are protected under the European Union (EU) 'Habitats Directive' (92/43/EEC), as implemented in Ireland by S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) and Part XAB of the Planning and Development Act 2000 (as amended). There are six SACs within 15km of the Proposed Wind Farm (see Figure 8-7 and Table 8-9). A search for further SACs beyond 15km with potential ecological links to the proposed development was also undertaken.

The full NPWS site synopses for designated areas are available on www.NPWS.ie.

8.7.2.1.2 Special Protection Areas (SPAs)

SPAs are designated under the EU Birds Directive (2009/147/EC) ('The Birds Directive'). There is one SPA within 15km of the Proposed Wind Farm. A search for further SPAs beyond 15km with potential ecological links to the proposed development was also undertaken.

The full NPWS Site synopses for designated areas are available on www.NPWS.ie.

8.7.2.2 Sites of National Importance

Sites of National Importance in Ireland are termed Natural Heritage Areas (NHAs) and proposed Natural Heritage Areas (pNHAs).

A total of four NHAs and 11 pNHAs are present within 15 km of the Proposed Wind Farm (see Table 8-10 and Figure 8-7 for details. A search for further pNHAs and NHAs with potential ecological links to the proposed development was also undertaken.

It should be noted that the following European sites overlap with sites of national importance:

- Ballynafagh Lake SAC (site code 001387) overlaps with Ballynafagh Lake pNHA (site code 001387)
- Ballynafagh Bog SAC (site code 000391) overlaps with Ballynafagh Bog pNHA (site code 000391)
- The Long Derries, Edenderry SAC (site code 000925) overlaps with The Long Derries, Edenderry pNHA (site code 000925)
- Mount Hevey Bog SAC (site code 002342) overlaps with Mount Hevey Bog pNHA (site code 002342)
- Mouds Bog SAC (site code 002331) overlaps with Mouds Bog pNHA (site code 002331)

The fifteen national sites are comprised of 11 proposed Natural Heritage Areas (pNHAs) and four Natural Heritage Areas (NHAs). Table 8-10 details the nationally designated sites located within 15 km of the Proposed Wind Farm, including their qualifying interests as well as the distances of these sites from the Proposed Wind Farm. Figure 8-8 respectively shows the location and extent of nationally designated sites within 15 km of the study area. The NPWS sites synopses for Natura sites and available information on proposed and designated Natural Heritage Areas can be viewed on www.npws.ie (NPWS, 2024). Sites designated as both National and European sites are assessed in the accompanying NIS.

Ballynafagh Bog pNHA and SAC (site code 000391) is located ca. 8.7 km from the closest turbine (turbine 2) within the Proposed Wind Farm. The site is a raised bog situated c.1k m west of Prosperous, Co. Kildare. The site contains the priority habitat active raised bog along with degraded raised bog and rhynchosporion vegetation, the site also supports breeding merlin, curlew and snipe.

Ballynafagh Lake pNHA and SAC (site code 001387) is located ca. 8 km from the closest turbine (turbine 2) within the Proposed Wind Farm. Ballynafagh Lake is located about 2 km north-west of Prosperous in Co. Kildare. It is a shallow alkaline lake with some emergent vegetation. The Blackwood Feeder, which connects Ballynafagh Lake to the Grand Canal, is also included in the site. The site contains the Annex habitat alkaline fens [7230] along with important species such as Desmoulin's whorl snail [1016] and marsh fritillary [1065].

The Long Derries, Edenderry pNHA and SAC (site code 000925) is located ca. 8 km from the closest turbine (turbine 1) within the Proposed Wind Farm. The Long Derries cSAC is located approximately 5 km south-east of Edenderry in Co. Offaly and is part of a low esker ridge running from Edenderry to Rathdangan. It consists primarily of glacial gravels interspersed with loam and peat soil. The site contains the priority Annex I habitat [6210] orchid-rich calcareous grassland.

Ballina Bog pNHA (site code 000390) is located ca. 5.5 km from the nearest turbine (turbine 6) within the Proposed Wind Farm. Ballina Bog is situated about 8 km west of Enfield and just south-west of Moyvalley in an elongated valley in Co. Kildare. Much of the surface is of good quality and quite wet in spite of the presence of many drains. The drains cross the bog in a north-east to south-west direction and also a few run east-west. The former are shallow and of long standing. Many have been filled in by bog moss (Sphagnum spp.) growth but retain moving water towards the edges of the bog. Two much deeper drains were inserted in the early 1980s and may cause more long-term damage to the bog. The vegetation and structure of the surface is well developed, especially in the southern half. Substantial areas of hummock and hollow topography exist, with pools and active Sphagnum growth. Much of the Sphagnum is *S. magellanicum*. Heather (*Calluna vulgaris*) and cottongrasses (*Eriophorum vaginatum* and *E. angustifolium*) are frequent on the surface. A large part of the bog has remained unburned for 20-30 years and contains an abundance of the lichen *Cladonia impexa*. Marginal peat cutting has been carried out at the northern and eastern ends of the bog. Despite the presence of many drains, the condition of the vegetation and surface makes this bog of considerable scientific importance. It is one of the most easterly raised bogs which are relatively intact. Under the NRA site evaluation criteria (NRA, 2009a) this site would be rated as of 'National Importance' and is therefore a key receptor for the current assessment.

Donadea Wood pNHA (site code 001391) is located ca. 7.3 km from the closest turbine (turbine 10) within the Proposed Wind Farm. This site is located about 6 km north of Prosperous in Co. Kildare. It is the old demesne woodland of Donadea Castle and is now owned by Coillte. The soil of the area is glacial drift. The entire site has been planted with a mix of deciduous and coniferous trees. Ash (*Fraxinus excelsior*) is the predominant deciduous species, with some cherry (*Prunus* spp.), oak (*Quercus* spp.), beech (*Fagus sylvatica*) and sycamore (*Acer pseudoplatanus*). Occasional patches of elder (*Sambucus nigra*), hazel (*Corylus avellana*) and hawthorn (*Crataegus monogyna*) are found. The site is notable for the presence of two rare species of Myxomycete fungus, namely *Diderma chondrioderma* and *Licea testudinacea*, the latter in one of only two known Irish sites. Under the NRA site evaluation criteria (NRA, 200a9) this site would be rated as of 'National Importance' and is therefore a key receptor for the current assessment.

The Royal Canal pNHA (site code 002103) is located ca. 3.3 km from the nearest turbine (turbine 11) within the Proposed Wind Farm. The Royal Canal is a man-made waterway linking the River Liffey at Dublin to the River Shannon near Termonbarry Co. Longford. The canal has been designated as an NHA which is generally comprised of the central channel and the banks on either side of it. Under the NRA site evaluation criteria (NRA, 2009a) this site would be rated as of 'National Importance' and is therefore a key receptor for the current assessment.

The Grand Canal pNHA (site code 002104) is located ca. 5.5 km from the closest turbine (turbine 1) within the proposed development. The Grand Canal is a man-made waterway linking the River Liffey at Dublin with the Shannon at Shannon Harbour and the Barrow at Athy otter spraints are found along the towpath, particularly where the canal passes over a river or stream. The common newt breeds in the ponds on the bank at Gollierstown in Co. Dublin. The Rare and legally protected opposite-leaved pondweed (*Groenlandia densa*) (Flora Protection Order 1999) is present at a number of sites in the eastern section of the Main Line. The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species. Under the NRA site evaluation criteria (NRA, 2009a) this site would be rated as of 'National Importance' and is therefore a key receptor for the current assessment.

Carbury Bog NHA (site code 001388) is located ca. 3.8 km from the nearest turbine (turbine 5) within the Proposed Wind Farm. Carbury Bog NHA is situated 4 km north of Carbury, almost entirely within the townlands of Ardkill, Carbury and Knockcor, County Kildare. Carbury Hill, which rises to 142 m, lies directly south of the bog. This site originally consisted of two lobes but much of the large north-west lobe is actively cutover and has been excluded from the site. The site consists of four sections separated by the old Edenderry railway line and the Carbury- Broadford road. Overall the southern section is quite wet with good hummock/hollow development. There is some marginal scrub woodland along the margins of the small western section. A narrow strip of deciduous woodland cuts through the main section in line with the old railway. Much of the high bog has vegetation typical of a Midland Raised Bog with ling heather (*Calluna vulgaris*) and cottongrass (*Eriophorum* spp.). Other species present include bog-rosemary (Andromeda polifolia) and cranberry (*Vaccinium oxycoccos*). Under the NRA site evaluation criteria (NRA, 2009a) this site would be rated as of 'National Importance' and is therefore a key receptor for the current assessment.

Hodgestown Bog NHA (site code 001393) is located ca. 6 km from the closest turbine (turbine 2) within the Proposed Wind Farm. Hodgestown Bog NHA is located 4 km north-west of Prosperous, mostly in the townlands of Hodgestown, Coolearagh East and Garvoge in Co. Kildare. The site comprises a raised bog that includes both areas of high bog and cutover bog. This raised bog was originally part of a much larger area of bog that has now been cutover and reclaimed for forestry and agriculture. Hodgestown Bog is separated by a mineral ridge from Ballynafagh SAC (391) and together these are two of the bogs at the eastern extreme of the range of raised bogs in Ireland. Although Hodgestown bog has no pools there are hummocks throughout the high bog and there is also a small hummock/hollow complex. Cutover is found all around the high bog. Under the NRA site evaluation criteria (NRA, 2009a) this site would be rated as of 'National Importance' and is therefore a key receptor for the current assessment.

Molerick Bog NHA (site code 001582) is located ca. 12.7 km km from the closest turbine (turbine 6) within the Proposed Wind Farm. Molerick Bog NHA is situated approximately 4 km south-west of Longwood in the townlands of Molerick, Anneville and Blackshade Co. Meath. The site comprises a raised bog that includes both areas of high bog and cutover bog. The site is bounded by the Dublin-Sligo railway line to the north and local roads to the east. The site consists of a small basin bog with a dry surface. Cutover is found all around the site, there is broadleaved woodland located to the south-west, wet woodland is located to the north-west, scrub to the east, humid grassland to the south, a flush/fen area to the west and humid grassland on mineral soil to the north-west. Under the NRA site evaluation criteria (NRA, 2009a) this site would be rated as of 'National Importance' and is therefore a key receptor for the current assessment.

Black Castle Bog NHA (site code 000570) is located ca. 14.3 km from the closest turbine (turbine 1) within the Proposed Wind Farm. Black Castle Bog NHA is situated approximately 8 km north-west of Edenderry, mainly in the townlands of Clonmore, Ballyheashill and Ballymacwilliam in County Meath. The site comprises a raised bog that includes both areas of high bog and cutover bog. The north-western margins of the site are bounded by roads and those on the south-east are bounded mainly by scrub and woodland. The site consists of one crescent-shaped lobe, which is quite flat. There is an absence of permanent pools on the high bog. The raised bog is of particular interest as it is one of the most easterly remaining raised bogs in the country. The peripheral area of abandoned cutover bog has developed into a range of different habitats. Under the NRA site evaluation criteria (NRA, 2009a) this site would be rated as of 'National Importance' and is therefore a key receptor for the current assessment.

Mount Hevey Bog pNHA and SAC (site code 001587) is located ca. 14.8 km from the closest turbine (turbine 6) within the Proposed Wind Farm. Mount Hevey Bog is situated approximately 4 km north-east of Kinnegad, in the townlands of Cloncrave, White Island, Aghamore, Kilwarden and Kilnagalliagh. The Meath-Westmeath County boundary runs through the centre of the bog. The site comprises a raised bog that includes both areas of high bog and cutover bog. The Dublin-Sligo railway runs through the northern part of the bog isolating two northern lobes. The northern lobes are adjacent to the Royal Canal.

Ballynabarny Fen pNHA (site code 001573) is located ca. 10.9 km from the closest turbine (turbine 6) within the Proposed Wind Farm. Ballynabarny Fen lies in a small, deep, artificially-created valley between the embankments of the Royal Canal and the nearby railway, and is situated about 3km. west-north-west of Longwood. In 1972 An Foras Forbartha described the core fen area as rich in sedges (such as *Carex diandra, C.lepidocarpa, C.disticha, C.panicea, C.flacca and C.rostrata*) with Grass of parnassus (*Parnassia palustris*), a spike-rush species (*Eleocharis quinqueflora*) and Variegated Horsetail (*Equisetum variegatum*) were also observed. The latter species is relatively rare in Ireland. Under the NRA site evaluation criteria (NRA, 2009a) this site would be rated as of 'National Importance' and is therefore a key receptor for the current assessment.

Rathmoylan Esker pNHA (site code 000557) is located ca. 10.5 km from the closest turbine (turbine 11) within the Proposed Wind Farm. Rathmoylan Esker is a Natural Heritage Area comprised of several segments on a series of northwest-southeast trending eskers located 7 km south of Trim near the village of Rathmoylan. Several parts of these eskers have been colonised by semi-natural deciduous and mixed woodland. Because of extensive quarrying operations, only three intact areas of wooded esker now remain. The most natural and undisturbed portion of woodland has developed on a narrow esker ridge surrounded by pasture on three sides and an abandoned quarry on the other. Ash (Fraxinus excelsior) is the dominant tree in the canopy with frequent Beech (*Fagus sylvatica*) present, particularly in the drier soils near the summit of the esker. The latter species is relatively rare in Ireland. Under the NRA site evaluation criteria (NRA, 2009a) this site would be rated as of 'National Importance' and is therefore a key receptor for the current assessment.

Mouds Bog pNHA and SAC (site code 002331) is located ca. 14.4 km from the closest turbine (turbine 2) within the Proposed Wind Farm. Mouds Bog is located about 3 km north-west of Newbridge in Co. Kildare, close to the Hill of Allen, and includes amongst others, the townlands of Grangehiggin, Barretstown and Hawkfield. The site comprises a raised bog that includes both areas of high bog and cutover bog. Much of the margins of the site are bounded by trackways. Active raised bog comprises areas of high bog that are wet and actively peatforming, where the percentage cover of bog mosses (*Sphagnum* spp.) is high, and where some or all of the following features occur: hummocks, pools, wet flats, Sphagnum lawns, flushes and soaks. Degraded raised bog corresponds to those areas of high bog whose hydrology has been adversely affected by peat cutting, drainage and other land use activities, but which are capable of regeneration.

Table 8-9: European Sites within potential ZoI of Proposed Development

Site	Code	Designated Features	Closest Turbine
Ballynafagh Lake SAC	001387	• Alkaline fens [7230] • *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016] • *Euphydryas aurinia* (Marsh Fritillary) [1065]	8 km (turbine 2)
The Long Derries, Edenderry SAC	000925	• Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210]	8 km (turbine 1)
Ballynafagh Bog SAC	000391	• Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150]	8.7 km (turbine 2)
River Boyne And River Blackwater SAC	002299	• Alkaline fens [7230] • Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] • *Lampetra fluviatilis* (River Lamprey) [1099] • *Salmo salar* (Salmon) [1106] • *Lutra lutra* (Otter) [1355]	10.2 km (turbine 6)
River Boyne and River Blackwater SPA	004232	• Kingfisher (*Alcedo atthis*) [A229]	10.2 km (turbine 6)
Mouds Bog SAC	002331	• Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150]	14.4 km (turbine 2)
Mount Hevey Bog SAC	002342	• Active raised bogs [7110] • Degraded raised bogs still capable of natural regeneration [7120] • Depressions on peat substrates of the Rhynchosporion [7150]	14.8 km (turbine 6)

Table 8-10: National Sites within potential ZoI of Proposed Development

Site	Code	Features of Interest	Summary Description	Closest Turbine
Royal Canal pNHA	002103	Aquatic Flora and Fauna, Corridor value	The Royal Canal is a man-made waterway linking the River Liffey at Dublin to the River Shannon near Termonbarry Co. Longford. The canal has been designated as an NHA which is generally comprised of the central channel and the banks on either side of it.	3.3 km (turbine 11)
Carbury Bog NHA	001388	Raised Bog Habitat	The site consists of four sections separated by the old Edenderry railway line and the Carbury-Broadford road. A narrow strip of deciduous woodland cuts through the main section in line with the old railway. Much of the high bog has vegetation typical of a Midland Raised Bog.	3.8 km (turbine 5)
Grand Canal pNHA	002104	Diversity of species, corridor value, Flora Protection Order Species	The Rare and legally protected Opposite-leaved Pondweed (*Groenlandia densa*) (Flora Protection Order 1999) is present at a number of sites in the eastern section of the Main Line. The ecological value of the canal lies more in the diversity of species it supports along its linear habitats than in the presence of rare species.	5.5 km (turbine 1)
Ballina Bog pNHA	000390	Raised Bog Habitat	Ballina Bog is situated about 8km west of Enfield and just south-west of Moyvalley in an elongated valley in Co. Kildare. Much of the surface is of good quality and quite wet in spite of the presence of many drains.	5.5 km (turbine 6)
Hodgestown Bog NHA	001393	Raised Bog Habitat	The site comprises a raised bog that includes both areas of high bog and cutover bog.	6 km (turbine 2)

Site	Code	Features of Interest	Summary Description	Closest Turbine
Donadea Wood pNHA	001391	Two rare species of Myxomycete fungus and woodland	This site is located about 6km north of Prosperous in Co. Kildare. The entire site has been planted with a mix of deciduous and coniferous trees. The site is notable for the presence of two rare species of Myxomycete fungus, namely *Diderma chondrioderma* and *Licea testudinacea*, the latter in one of only two known Irish sites	7.3 km (turbine 10)
The Long Derries, Edenderry pNHA (also an SAC)	000925	[6210] Orchid-rich Calcareous Grassland*	The Long Derries is located approximately 5 km south-east of Edenderry in Co. Offaly and is part of a low esker ridge running from Edenderry to Rathdangan. It consists primarily of glacial gravels interspersed with loam and peat soil.	8 km (turbine 1)
Ballynafagh Lake pNHA (also an SAC)	001387	[7230] Alkaline Fens [1016] Desmoulin's Whorl Snail (*Vertigo moulinsiana*) [1065] Marsh Fritillary (*Euphydryas aurinia*)	Ballynafagh Lake is located about 2 km north-west of Prosperous in Co. Kildare. It is a shallow alkaline lake with some emergent vegetation. The Blackwood Feeder, which connects Ballynafagh Lake to the Grand Canal, is also included in the site. The site contains the Annex Habitat Alkaline fens [7230].	8 km (turbine 2)
Ballynafagh Bog pNHA (also an SAC)	000391	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation	The site is a raised bog situated c.1km west of Prosperous, Co. Kildare. The site contains the priority habitat active raised bog and also supports breeding Merlin.	8.7 km (turbine 2)

Site	Code	Features of Interest	Summary Description	Closest Turbine
Molerick Bog NHA	001582	Peatlands [4]	Comprises a raised bog that includes both areas of high bog and cutover bog. The site is bounded by the Dublin-Sligo railway line to the north and local roads to the east.	12.7 km (turbine 6)
Black Castle Bog NHA	000570	Peatlands [4]	Raised bog that includes both areas of high bog and cutover bog. The north-western margins of the site are bounded by roads and those on the south-east are bounded mainly by scrub and woodland.	14.3 km (turbine 1)
Mount Hevey Bog pNHA (also an SAC)	001584	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	The site comprises a raised bog that includes both areas of high bog and cutover bog. The Dublin-Sligo railway runs through the northern part of the bog isolating two northern lobes. The northern lobes are adjacent to the Royal Canal.	14.8 km (turbine 6)
Ballynabarny Fen pNHA	001573	Fen vegetation	This sedge-rich fen lies in a small, deep, artificially-created valley between the embankments of the Royal Canal and the nearby railway, and is situated about 3km. west-north-west of Longwood.	10.9 km (turbine 6)
Rathmoylan Esker pNHA	000557	Eskers Woodland	Comprised of several segments of eskers near the village of Rathmoylan. Several parts of these eskers have been colonised by semi-natural deciduous and mixed woodland.	10.5 km (turbine 11)

Site	Code	Features of Interest	Summary Description	Closest Turbine
Mouds Bog pNHA (also an SAC)	002331	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	Mouds Bog is located north-west of Newbridge in Co. Kildare, close to the Hill of Allen. The site comprises a raised bog that includes both areas of high bog and cutover bog. Much of the margins of the site are bounded by trackways.	14.4 km (turbine 2)

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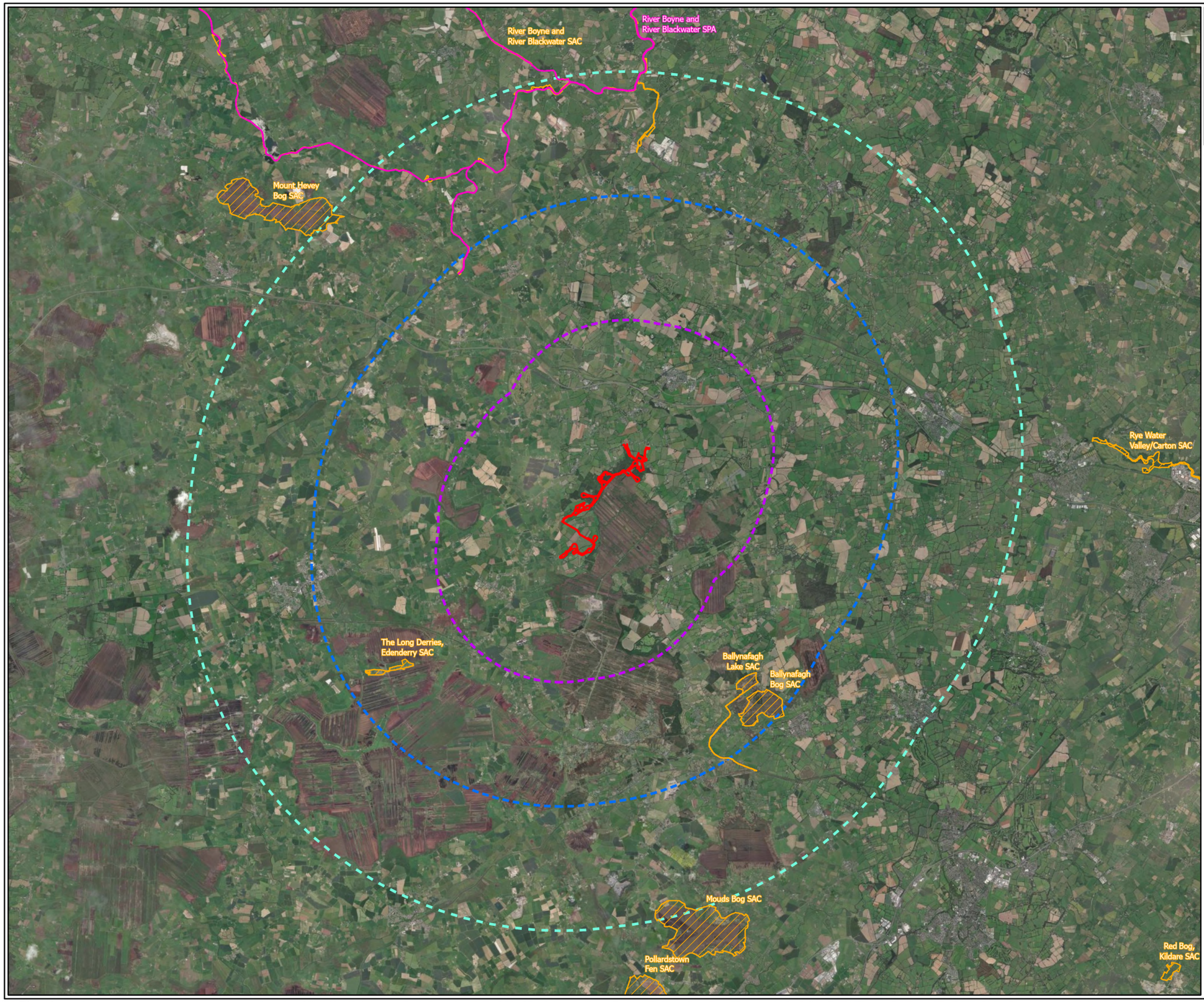

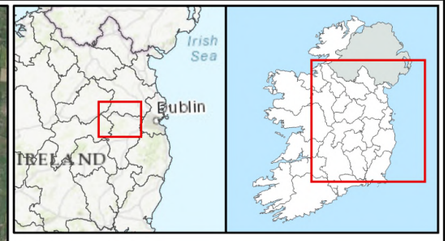

Legend

- Proposed Development Boundary
- 5km
- 10km
- 15km
- Special Protection Areas
- Special Area of Conservation

N
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0 2.5 5 10 Kilometers

TITLE:	European Sites Within Potential Zone of Interest		
PROJECT:	Drehid Wind Farm and Substation		
FIGURE NO:	8.7		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:150,000	**REVISION:**	0
DATE:	12/05/2025	**PAGE SIZE:**	A3

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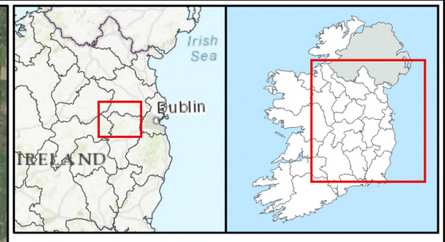

Legend

- Proposed Development Boundary
- 15km
- Natural Heritage Areas
- Proposed Natural Heritage Areas

N
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0 2.5 5 10 Kilometers

TITLE: National Sites Within 15km			
PROJECT: Drehid Wind Farm and Substation			
FIGURE NO:	8.8		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:150,000	**REVISION:**	0
DATE:	12/05/2025	**PAGE SIZE:**	A3

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8.7.2.3 Other Designated Sites

8.7.2.3.1 Nature Reserves

The closest nature reserve is Pollardstown Fen (also an SAC and pNHA), located c. 17.2 km south of the Proposed Wind Farm. The next closest nature reserve is Raheenmore Bog ((also and SAC and pNHA) c. 28.9 km west.

The are no nature reserves within 10 km of the Proposed Wind Farm. The closest site is Pollardstown Fen (also an SAC and pNHA) located approximately 17.2 km south west of the nearest proposed turbine (T2). This part-state owned site is located within a shallow depression, fed by c. 40 springs allowing for the in-flow of calcium-rich waters from the Curragh and limestone areas to the north. These springs along with the fen nature of the site allows for priority species such as all three Vertigo snail species to survive namely [1013] Geyer's Whorl Snail (*Vertigo geyeri*), [1014], Narrow-mouthed Whorl Snail (*Vertigo angustior*) and [1016] Desmoulin's Whorl Snail (*Vertigo moulinsiana*).

Coolree Community Nature Reserve is an informal/undesignated nature reserve initiated by local volunteers and residents of the area. Entrance to the reserve is approximately 455m north of the Proposed Wind Farm. While no formal site boundary or details of site biodiversity are available, it is considered that the reserve overlaps the norther-western portion of the Proposed Development, due to evident enhancement activities such as installation of bat and bird boxes within the Proposed Development.

Information concerning Coolree Nature Reserve is not present within official webpages of the National Parks and Wildlife Services and on communication with NPWS it was determined that Coolree is not an official NPWS nature reserve. (NPWS) (https://www.npws.ie/protected-sites).

8.7.2.3.2 OPW Wildlife Sanctuaries

Ballynafagh Lake (Blackwood Lake) (Wildfowl Sanctuary Code: WFS-30) is located approximately 7.9 km south-east of the nearest infrastructure of the proposed Drehid wind farm development. This site is present under the OPWs List of Wildlife Sanctuaries Wildlife Service Report (1990) and is also classified as an SAC (Site Code: 1387), of the same name. Features of interest within this site includes Alkaline fens [7230], *Vertigo moulinsiana* (Desmoulin's Whorl Snail) [1016] and *Euphydryas aurinia* (Marsh Fritillary) [1065].

8.7.2.3.3 Coillte Biodiversity Areas

Under Forest Stewardship Council (FSC) guidelines, Coillte is required to identify a minimum of 15% of each Forest Management Unit that is to be managed with nature conservation as a primary management objective. Current management objectives build on this, with a stated goal of increasing the area of the Coillte estate managed primarily for nature from 20% to 30% by 2025, and to transform enough areas of Coillte forests so that 50% of the Coillte estate is managed primarily for nature in the long term. To contribute to these goals, 'potential biodiversity areas' that had nature conservation value, or that merited nature-focused management were identified. Coillte's Nature Conservation Strategy emphasizes the conservation of these habitats at landscape or Forest Management Unit (FMU) level in order to ensure that the designated areas are protected during forest operations.

There are two Coillte biodiversity areas overlapped by the Proposed Development. These are the Dunfierth area which includes intact raised bog and conifer plantation (Proposed Development overlaps sections of conifer plantation), and the Kilmurry area which is comprised primarily of drained/desiccated raised bog which has been colonised by conifers and birch trees.

The Coillte management objectives for the Dunfierth area are to replace existing Lodgepole pine conifer plantation with Scots pine and birch, and to restore the existing raised bog. It is noted that a small woodland block has been felled and replanted with Scots pine. The raised bog is not pristine, but is in good condition, aided by the infilling of perimeter drains with sphagnum. The management objective for the Kilmurry area is to implement gradual thinning to create an open conifer stand on bog.

While not designated as biodiversity areas, the presence of long-established woodland blocks in the north of the site is also noted. These vary in character from stands of mature trees, through immature Scots pine plantations, to immature woodland replanted with native broadleaved species. The proposed development does not overlap any areas of mature broadleaved woodland.

8.7.2.3.4 Ramsar Sites

The two closest Ramsar Sites are Pollardstown Fen and Raheenmore Bog, which overlap the NPWS nature reserves/SACs described above.

8.7.2.3.5 Wetlands Ireland Sites

The register of Irish wetland sites curated by Wetlands Ireland was also consulted. The primary sites of interest are the intact and partially drained sections of raised bog (Mulgeeth Bog) to the south of T9/T10 and east of T8. These have been surveyed in detail during the course of ecological surveys at the Proposed Wind Farm and are a core feature in the ecological assessment.

Other areas of remnant raised bog nearby include Hortland Bog (c. 3 km east of T10) and Drumachon bog c. 500m east of T2. Timahoe North Bog, located east and south of the Proposed Wind Farm, is dominated by recolonising cutover bog. Wetlands Ireland also notes a number of minor wetland sites in the wider area surrounding the Proposed Wind Farm, including wet woodlands, artificial ponds, springs and areas of wet grassland/marsh.

8.7.2.4 Rehabilitation of Adjacent Bord Na Móna Bog

It is noted that the draft rehabilitation plan for Timahoe North Bog (Bord Na Móna, 2017) concluded that no interventions are required to initiate rehabilitation of this bog (located outside of and south-east of the Proposed Wind Farm footprint) due to the relatively long period since peat extraction ended and the advanced progress of natural revegetation.

It is noted that part of the area of recolonising cutaway bog near T8 which is within the proposed development boundary but not overlapped by the proposed footprint forms part of Timahoe North Bog.

8.7.3 Habitats

8.7.3.1 Wind Farm, Substation and Grid Connection

The habitats at the Proposed Wind Farm site are dominated by conifer plantation/woodland and agricultural habitats (pasture and hedgerows/treelines). Various peatland habitats and mosaics ranging from more or less intact raised bog to severely disturbed cutover bog are also present in the wider area. Bog woodland (WN7) (not Annex I habitat) which has established on former peat harvesting areas and adjacent disturbed/drained areas is common in the area.

Lowland depositing rivers are present, represented by the Fear English River and its tributaries.

It is noted that the proposed grid connection is short, with the proposed high voltage line loop-in located c. 415m north of the Proposed Substation. As such, the grid connection habitat survey study area is encapsulated within the overall habitat survey study area for the Proposed Wind Farm.

The intact raised bog south of T9/T10 corresponds with the Annex I priority habitat “active raised bog [7110], and the drained but largely intact raised bog south-east of T8 contains areas with links to the Annex I habitat "Degraded raised bogs still capable of natural regeneration [7120]". No areas of Annex I habitat are overlapped by any proposed infrastructure.

8.7.3.1.1 WD4 Conifer plantation

Conifer plantation is widespread in the northern part of the Proposed Wind Farm. There is considerable variation in the age and character of forestry blocks, ranging from recently replanted areas to mature stands. Mature blocks contain Sitka spruce *Picea sitchensis*, lodgepole pine *Pinus contorta* and occasionally eastern hemlock *Tsuga canadensis* and larch *Larix* Sp. Less mature blocks are typically dominated by Scots pine *Pinus sylvestris* and Sitka.

The ground flora of more recently re-planted blocks is characteristic of recolonisation following disturbance. Downy birch *Betula pendula* and sycamore *Acer pseudoplatanus* saplings form dense growths in some areas. Raspberry *Rubus idaeus* is also common in open areas. Soft rush *Juncus effusus* and horsetail Equisetum Sp. are present in wetter areas. Rosebay willowherb *Chamaenerion angustifolium* and bramble *Rubus fruticosus* are also present. Birch polypore *Fomitopsis betulina* was recorded growing on birch in replanted conifer plantation

One block with wetter ground conditions north-east of T9 recently replanted with Scots pine contained hare's tail cottongrass *Eriophorum vaginatum*, red bogmoss *Sphagnum capillifolium*, purple moor-grass *Molinia caerulea,* heath plait moss *Hypnum jutlandicum,* common haircap moss *Polytrichum commune,* ling heather *Calluna vulgaris* and cross-leaved heath *Erica tetralix*, in addition to oak *Quercus* Sp. seedlings and raspberry.

Blunt-leaved bogmoss *Sphagnum palustre* was recorded in wet mature conifer plantation east of T9. Tamarisk moss *Thuidium tamariscinum* was also recorded in mature plantations, and immature downy birch *Betula pendula* and ling are present in some clearings within mature conifer plantation.

The Schedule III invasive species *Rhododendron ponticum* was recorded in conifer plantation c. 170m north-east of T9. Another non-native species, Lawson cypress *Chamaecyparis lawsoniana* was observed invading a block of conifer plantation c. 320m west of T11.

Conifer plantation is assessed as **Local Importance Lower Value**.

It is overlapped by proposed internal access tracks, hard standings, wind turbines, the onsite substation and T6, T7, T9, T10 and T11 bat felling buffers.

Sections of conifer plantation comprised of mature lodgepole pine and recently replanted Scots pine are encompassed by the Dunfierth Coillte Biodiversity area.

Plate 8-1: WD4 Conifer plantation

8.7.3.1.2 WD2 Mixed broadleaved/conifer woodland

Mixed stands of broadleaved/conifer woodland are also present at the Proposed Wind Farm. Tree species present in this habitat include Sitka spruce, eastern hemlock, lodgepole pile, larch, downy birch, grey willow, holly *Ilex aquifolium*, rowan *Sorbus aucuparia*, beech *Fagus sylvatica*, sycamore and hazel *Corylus avellana*. Other flora present include broad buckler-fern *Dryopteris dilitata*, honeysuckle *Lonicera periclymenum*, bilberry *Vaccinium myrtillus*, bramble, tamarisk moss *Thuidium tamariscinum*, big shaggy-moss *Rhytidiadelphus triquetrus*. Reindeer lichen *Cladonia rangiferina* and red bogmoss were recorded in a clearing in one location.

A growth of the Schedule III invasive species *Rhodoendron ponticum* c. 2x3m in extent was recorded in this habitat at one location c. 15m east of the T8 hard standing.

This woodland type is likely to have originated from a mix of intentional planting and establishment of native broadleaved species in unmanaged conifer blocks and gaps between replanted conifer blocks.

This habitat type is **Local Importance Higher value**.

It is overlapped by proposed internal access tracks, hard standings, wind turbines, the onsite substation and T7, T8, and T11 bat felling buffers.

A section of mixed conifer/broadleaved woodland is encompassed by the Dunfierth Coillte Biodiversity area. This area is overlapped by a section of proposed access track felling buffer.

Plate 8-2: WD2 Mixed broadleaved/conifer woodland

8.7.3.1.3 WD3 (Mixed) Conifer woodland

Areas dominated by self-seeded conifer stands and dense conifer woodland lacking drains and linear patterns associated with conifer plantation present at the Proposed Wind Farm fit within this category, which is distinct form WD4 Conifer plantation.

Tree species present include Sitka spruce and lodgepole pine. Ling heather is present in clearings and parts where the canopy is thinner, indicating the establishment of conifer woodland on peatland.

This habitat type is **Local Importance Higher value**.

It is overlapped by a section of proposed internal access track.

This habitat is overlapped by the Kilmurry Coillte Biodiversity area.

Plate 8-3: WD3 (Mixed) Conifer woodland

8.7.3.1.4 WS2 Immature woodland

Areas in the northern part of the Proposed Wind Farm which previously supported conifer plantation (during 2018 EIAER surveys) have since been felled and replanted with broadleaved species including pedunculate oak *Quercus robur*, rowan and hazel (current trees are c. 3 years old). Older self-seeded ash *Fraxinus excelsior* downy birch trees are also present in some areas. Other species present include bramble, rosebay willowherb, soft rush, raspberry, tufted hairgrass *Deschampsia cespitosa*, herb-Robert *Geranium robertianum*, Yorkshire fog *Holcus lanatus* and meadowsweet *Filipendula ulmaria*. Common reed *Phragmities australis* is present in some waterlogged areas. Stagshorn fungus *Calocera viscosa* was recorded in one area with desiccated peaty soil.

The diamond shaped polygon traversed by existing and proposed north-western access tracks is depicted as woodland in 1st edition OS mapping (1829-1842). As noted above however, prior to being replanted recently with oak, it supported conifer plantation. As such, while it has been wooded for a long period, it has also been subjected to intensive management and periodically undergone drastic changes during this period.

This habitat type is **Local Importance Higher value**.

It is overlapped by a section of proposed internal access track.

Plate 8-4: WS2 Immature woodland

8.7.3.1.5 WN7 Bog woodland

Bog woodland dominated by downy birch is distributed across the Proposed Wind Farm. Other tree species including grey willow, holly, pedunculate oak and hazel were present in isolated pockets. Scots pine and eastern hemlock were also recorded within this habitat. The field and shrub layers are typically species-poor with bramble and ivy dominating. Bracken *Pteridium aquilinum* is also present in clearings and marginal areas. Tamarisk moss and Glittering Wood-moss *Hylocomium splendens* were also recorded.

The bog woodland recorded in the area of the Proposed Wind Farm has all established on former peat cutting areas and drained peatland, and excepting downy birch and grey willow, there are no other species in the bog woodland onsite which are listed as typical bog woodland species in relevant guidance (NPWS, 2019). Typical moss species associated with the Annex I habitat such as *Hylocomium splendens, Aulacomnium palustre* and *Sphagnum* species are absent. As such it is not representative of the Annex I habitat *Bog Woodland* [91D0]* which occurs on intact bogs. These findings concur with previous assessments including the 2019 FI response.

This habitat type is **Local Importance Higher value**.

It is overlapped by proposed internal access tracks, hard standings, turbine T8 and T7, T8, and T11 bat felling buffers.

A small area of this habitat is overlapped by the Kilmurry Coillte Biodiversity area.

Plate 8-5: WN7 Bog woodland

8.7.3.1.6 WN7/WS1 Bog woodland/Scrub Mosaic

Bog woodland also occurs as a mosaic with scrub. This mosaic is similar to the bog woodland described above, but is lower-growing and is interspersed with numerous clearings and scrub-type vegetation. Bramble and bracken are the dominant species in clearings and areas with lower/open canopy.

This habitat type is **Local Importance Higher value**.

It is overlapped by a section of proposed internal access track.

Plate 8-6: WN7/WS1 Bog woodland/Scrub Mosaic

8.7.3.1.7 WD4/WN7 Conifer plantation/Bog woodland Mosaic

This habitat mosaic occurs where conifer plantations is interspersed with birch woodland thickets which have colonised gaps and outcompeted conifers. Downy birch, Sitka spruce and Scots pine are the dominant tree species. Lodgepole is also present. Bracken, bramble and ivy were also recorded.

This habitat type is **Local Importance Higher value**.

It occurs adjacent to a section of existing forestry access track between T9 and T11 and is overlapped by the access track felling buffer.

Plate 8-7: WD4/WN7 Conifer plantation/Bog woodland Mosaic

8.7.3.1.8 WD1 Mixed broadleaved woodland

Mixed broadleaved woodland occurs in a number of areas.

An area of mature woodland in the northern part of the Proposed Wind Farm (abutting the eastern flank of the proposed substation footprint) is dominated by mature pedunculate oaks. Mature beech and birch trees area also present. Oak saplings, dense thickets of birch saplings and brambles are present in the shrub layer. This area is depicted as woodland in 1st edition OS mapping (1829-1842).

A number of elongated linear areas of mixed broadleaved woodland in the northern part of the Proposed Wind Farm are influenced by planting, with a high proportion of mature beech present. Other tree species recorded include ash, alder *Alnus glutinosa*, downy birch, eastern hemlock and Scots pine. Ivy, bramble and honeysuckle were also recorded in these areas. The linear area of broadleaved woodland extending to the east (towards the L5013) of the northern part of the Proposed Wind Farm is depicted as woodland in 2nd edition OS mapping (1898-1902). The linear section of broadleaved woodland extending to the north-west of the Proposed Wind Farm (existing Coillte access) is also depicted as woodland in 1st edition OS mapping. Neither of these linear blocks are overlapped by the Proposed Wind Farm.

This habitat occurs in a more semi-natural state in the central section of the Proposed Wind Farm. In this area, a former agricultural field adjacent to the bog has been recolonised by woodland and scrub, with grey willow being the dominant species. Hawthorn *Crataegus monogyna* is common, and beech saplings are common in parts. Elder *Sambucus nigra*, meadowsweet, bramble, wavy hairgrass *Deschampsia flexuosa* and fox-tail feather moss *Thamnobryum alopecurum* are also present. Elf-cup fungus *Sarcoscypha coccinea* and honey fungus *Armillaria mellea* were also recorded in this area. This stand of woodland is not overlapped by any proposed infrastructure.

Semi-mature oak plantation is present along the access proposed access route into the northern section of the site. This is dominated by 5-6m tall pedunculate oak trees, with rows of downy birch running through the blocks of oak. Occasional hazel trees are present, and ash saplings are abundant in some areas of the woodland floor. Ivy, nettle *Urtica dioica*, greater stitchwort *Stellaria holostea* common hogweed *Heracleum sphondylium*, wood avens *Geum urbanum*, hart's tongue fern *Asplenium scolopendrium*, swan's-neck thyme-moss *Mnium hornum* and fox-tail feather-moss *Thamnobryum alopecurum* are present in the field and ground layers. Hedgerows from remnant field boundaries comprised of elder, hawthorn, alder, grey willow and wild plum *Prunus domestica* have been subsumed by the plantation woodland. The proposed northern site access road traverses this habitat, making use of grassy/scrubby marginal areas but marginal sections of this woodland are overlapped by the proposed road footprint.

This habitat type is **local importance higher value**.

Plate 8-8: WD1 Mixed broadleaved woodland

8.7.3.1.9 WD1/WD4 Mixed broadleaved woodland/Conifer plantation Mosaic

In this habitat mosaic, remnants of mature woodland are interspersed with areas of semi-mature Scots pine.

This block is comprised of scattered mature oak, beech and eastern hemlock, with 5-10 year old Scots pine planted in open areas and underplanted around the older trees. Dense bramble, raspberry, and hedge bindweed *Calystegia sepium* are present in the shrub layer. This area is connected to the area of mixed broadleaved woodland described above and forms part of the same area depicted as woodland in 1st edition OS mapping (1829-1842).

It is likely that mature trees which have fallen or blown over have been replaced by conifer planting after gaps opened up.

This habitat type is **Local Importance Higher value.**

This habitat mosaic is not overlapped by any proposed infrastructure.

Plate 8-9: WD1/WD4 Mixed broadleaved woodland/Conifer plantation Mosaic

8.7.3.1.10 WS1/GS2 Scrub/Dry meadows and grassy verges Mosaic

A ringfort in the agricultural field north of T5 supports this habitat mosaic. Scrub around the margins is formed by hawthorn, blackthorn *Prunus spinosa*, bramble, elder, ivy and field rose *Rosa arvensis*. The grassy element is formed by cocksfoot *Dactylis glomerata*, bent-grass *Agrostis* Sp., yarrow *Achillea millefolium*, red clover *Trifolium pratense*, common knapweed *Centaurea nigra* and ribwort plantain *Plantago lanceolata*.

This habitat is also present along the margins of the oak plantations and conifer plantations along the proposed northern access track route. Grey willow, bramble, Yorkshire fog and cocksfoot are present throughout this Mosaic. Devil's bit scabious was also recorded in one location c. 50m south of the proposed northern access track.

This mosaic is **Local Importance Higher Value**.

It is overlapped by the proposed northern entrance access track.

Plate 8-10: WS1/GS2 Scrub/Dry meadows and grassy verges Mosaic

8.7.3.1.11 GA1 Improved agricultural grassland

Improved agricultural grassland is present across large areas of the southern part of the Proposed Wind Farm. The dominant species is perennial ryegrass *Lolium perenne*. Yorkshire fog is also present in some areas. Meadow buttercup *Ranunculus acris*, sorrel *Rumex acetosa*, dandelion *Taraxacum officinalis* Agg. and white clover *Trifolium repens* are also present. The stubble rosegill mushroom *Volvopluteus gloiocephalus* was recorded in one location.

Soils in some areas are prone to waterlogging, and peaty soil is prevalent closer to the bog.

This intensively managed habitat type is **Local Importance Lower Value**.

It is overlapped by proposed internal access tracks, construction access tracks, hard standings, wind turbines, and the temporary site compound.

Plate 8-11: GA1 Improved agricultural grassland

8.7.3.1.12 GA2 Amenity grassland

Small areas of amenity grassland were recorded in the north of the site. These are not subject to grazing by livestock but are mown. The dominant grass species were grasses such as annual meadow-grass *Poa annua*, and Yorkshire fog *Holcus lanatus*. Perennial rye-grass *Lolium perenne* was recorded in this habitat but is not abundant. Broadleaved herbs such as dandelion *Taraxacum* spp., *white clover* Trifolium repens, red clover *Trifolium pratense*, daisy *Bellis perennis*, common mouse-ear *Cerastium fontanum*, and self-heal *Prunella vulgaris* were also recorded.

This intensively managed habitat type is **Local Importance Lower Value**.

This habitat is not overlapped by any proposed infrastructure.

Plate 8-12: GA2 Amenity grassland

8.7.3.1.13 GA1/GS2 Improved agricultural grassland/ Dry meadows and grassy verges Mosaic

A field with muddy/peaty soil adjacent to Timahoe North Bog is used for horse grazing. There is some evidence of agricultural management intervention due to the presence of perennial ryegrass. Cocksfoot is also present. A number of forbs including ruderal species are present: Broadleaved dock *Rumex obtusifolius*, yarrow, greater plantain *Plantago major*, ribwort plantain, knapweed, field thistle *Cirsium arvense*, redshank *Persicaria maculosa*, ragwort *Jacobaea vulgaris*, meadowsweet, silverweed *Potentilla anserina*, white clover, creeping buttercup and knotgrass *Polygonum aviculare*.

This mosaic is **Local Importance Higher Value**.

It is not overlapped by any proposed infrastructure.

Plate 8-13: GA1/GS2 Improved agricultural grassland/ Dry meadows and grassy verges Mosaic

8.7.3.1.14 GA1 /GS4 Improved agricultural grassland/Wet grassland Mosaic

A field adjacent to the bog supports this habitat type. Grass species include perennial ryegrass, cocksfoot and Yorkshire fog. Soft rush, broadleaved dock, purple loosestrife *Lythrum salicaria* and marsh thistle *Cirsium palustre* are also present.

This habitat type is **Local Importance Higher value**.

It is not overlapped by any proposed infrastructure.

[Photo not available.]

8.7.3.1.15 HD1 Dense bracken

Dense bracken in present in a number of areas, typically associated with marginal cutover bog habitats and field boundaries.

This mosaic is local **importance lower value**.

It is not overlapped by any proposed infrastructure.

[Photo not available.]

8.7.3.1.16 WS1/HD1 Scrub/Dense bracken Mosaic

This mosaic is present in the transitional zone between woodland/scrub and adjacent peatland habitats. Species include bracken, grey willow, buckthorn *Rhamnus cathartica*, wavy hairgrass and glaucus sedge *Carex flacca*.

This habitat type is **Local Importance Higher value**.

It is not overlapped by any proposed infrastructure.

Plate 8-14: WS1/HD1 Scrub/Dense bracken Mosaic

8.7.3.1.17 GS2/GS3 Dry meadows and grassy verges/Dry-humid acid grassland Mosaic

This mosaic is present in an area bordering a former peat harvesting area on the northern edge of Timahoe North Bog. Grass species include purple moor-grass, cocksfoot and Yorkshire fog. Other species include devil's bit scabious *Succisa pratensis*, knapweed, nettle, bracken, gorse, downy birch and heath plait moss.

This mosaic is atypical, containing elements of both GS2 and GS3 and results from disturbance caused by drainage and peat cutting. Devil's bit scabious is abundant in this mosaic, and this in conjunction with physical characteristics make this a habitat of high suitability for marsh fritillary butterfly breeding.

This mosaic is **Local Importance Higher value**.

It is not overlapped by any proposed infrastructure.

Plate 8-15: GS2/GS3 Dry meadows and grassy verges/Dry-humid acid grassland Mosaic

8.7.3.1.18 GS2 Dry meadows and grassy verges

This habitat is present in a small field at the proposed northern site entrance. It is dominated by cocksfoot, and nettles are abundant in patches. Yorkshire fog, creeping bent-grass *Agrostis stolonifera*, Timothy grass *Phleum pratense,* bramble, common field-speedwell *Veronica persica*, creeping buttercup, meadow buttercup, marsh woundwort *Stachys palustris*, hard rush *Juncus inflexus*, spear thistle *Cirsium vulgare*, and rosebay willowherb *Chamaenerion angustifolium*.

This mosaic is **Local Importance Higher value**.

It is overlapped by the proposed northern entrance access track.

Plate 8-16: GS2 Dry meadows and grassy verges

8.7.3.1.19 PB1 Raised bog

This habitat is present adjacent to the Proposed Wind Farm in a number of different conditions.

Intact Raised Bog

The most intact and highest-quality example of this habitat is present to the south and south-west of T9 and T10. This area is known as Mulgeeth Bog, and would historically have formed part of the northern tip of the much larger Timahoe North Bog. While some drains are present in the southern part and marginal areas of this peat mass, the drains are well-vegetated and as such their effectiveness is reduced. Industrial peat cutting previously occurred in the main part of Timahoe North Bog to the south. Another adjacent section of Timahoe North Bog to the west and south-west was drained but not harvested. It is likely that this area of bog has become progressively wetter since cessation of peat harvesting in Timahoe North Bog and also due to the marginal drains not being maintained (these drains are visible in a more open state in 1996 orthophotography but more recent imagery and field observation show they are being reclaimed by peatland vegetation).

Ling heather is the dominant species in this area; common cottongrass *Eriophorum angustifolium* and hare's tail cottongrass are common. Other species include bog asphodel *Narthecium ossifragum*, bell heather *Erica cinerea*, bog rosemary *Andromeda polifolia*, cranberry *Vaccinium oxycoccos* and white-beaked sedge *Rhynchospora alba*. The latter was noted to be abundant in a shallow marginal drain recolonised by vegetation, and was also recorded growing in patches on the bog in association with Sphagnum mosses and areas of low open vegetation. Round-leaved sundew *Drosera rotundifolia* was also noted in one location. Sphagnum species present include *Sphagnum cuspidatum*, *S.papillosum, S.magellanicum, S.capillifolium* and *S. subnitens*. Sphagnum cover is high in parts, but not uniformly high across the entire habitat area.

Reindeer lichen was common, and devil's matchsticks lichen *Cladonia floerkeana*, a species which is indicative of disturbance was found in one location. The north-eastern side of the bog is being invaded by lodgepole pine spreading from the adjacent forestry plantation. This negatively impacts the overall conservation condition of the bog.

Due to the high degree of wetness, typical species, large extent, high sphagnum cover in parts, low number and ineffectiveness of drains, this area is classified as active raised bog and as such corresponds to the Annex I priority habitat "active raised bog [7110]". This finding reconfirms the assessment of this area detailed in previous reports and with in the 2019 FI response.

The edges of this habitat are clearly delineated by the abutting conifer plantations and drains running along it's north-western and north-eastern boundaries. These were mapped using up-to date aerial imagery and portable GIS technology confirmed by onsite observations.

Due to links with priority Annex I habitat, this area is of **International importance**. It is not overlapped by any proposed infrastructure but is in close proximity to T9 (27m), T10 (31m) and a short section of access road passes within 4m of this habitat. The main hard stand for T10 is located 9m form this habitat. A minor peripheral pad of the T10 hard standing measuring 15m x 5m is also located 3m from this habitat. The remainder (and majority) of the access track and hard standing areas located near this habitat range from 9m to 40m from this habitat.

This area is overlapped by the Dunfierth Coillte Biodiversity area.

Note on *Rhynchospora alba* and 'Depressions on peat substrates of the *Ryhnchosporion* [7150]

Patches of *Rhynchospora alba* were recorded throughout this area of bog during current surveys. However, these areas do not correspond to the Annex I habitat 'Depressions on peat substrates of the *Ryhnchosporion* [7150]' due to a lack of other typical/indicator species required to form the Annex I vegetation community, in addition to the absence of characteristic conditions. The only other indicator plants recorded in association with *Rhynchospora alba* were limited to *Sphagnnum* mosses, and as such there were no well-developed examples of this community. It is noted that the list of typical species for this habitat in raised bog was updated in 2019 (NPWS, 2019) and no longer includes *Drosera rotundifolia*.

Article 17 Reporting (NPWS, 2019) notes that 'In raised bogs, *Rhynchospora* vegetation communities are considered to qualify as the Annex I habitat when they occur in their most developed form in the wettest sections of active raised bogs, corresponding with pools, Sphagnum lawns and hollows', and also notes 'Only when the Rhynchospora species are associated with plant communities of the most sensitive and undisturbed parts of blanket bog and associated wetland habitats are they considered to correspond with the Annex I habitat'. Considering the absence of typical species other than *Sphagnum*, occurrence in areas which are not wetter than other parts of the bog, and occurrence in disturbed areas (drains), it can be concluded that the areas of *Rhynchospora alba* vegetation in the intact raised bog are not representative of the Annex I habitat 'Depressions on peat substrates of the *Ryhnchosporion* [7150]'.

These observations and findings align with the assessment contained in the 2019 FI response, and current surveys have confirmed that conditions in this habitat remain unchanged. The absence of any proposed infrastructure in this habitat also remains unchanged.

Plate 8-17: Intact Raised Bog (Mulgeeth Bog)

Intact Raised Bog - Drained

An area of raised bog dissected by small drains and also containing several larger arterial drains is present to the west and south-west of the more intact bog described above. This bog is still largely intact and retains natural characteristics despite drainage.

Vegetation is dominated by taller-growing ling closer to large drains. In wetter areas further from the large drains, more open vegetation dominated by hare's tail cottongrass and lower-growing heather. Bog asphodel, common cottongrass, bell heather, round-leaved sundew and bog rosemary area also present. White-beaked sedge is abundant in open waterlogged areas. *S. capillifolium* is present, and *S. cuspidatum* is present in wet depressions. Sphagnum cover is moderate to high but sporadically distributed. Reindeer lichen is common.

The vegetation is lower-growing than the more intact bog and microtopography is less pronounced but there is still a mosaic of heather-dominated vegetation and open pools/sedge/sphagnum-dominated vegetation. Areas closer to the margins where cut banks are present are drier and eroded.

Due to the wet conditions, semi-natural vegetation characteristics and potential for expansion of Sphagnum cover, this section of the bog contains areas with links to the Annex I habitat "Degraded raised bogs still capable of natural regeneration [7120]".

Due to potential links with Annex I habitat and potential for regeneration, this area is of **National Importance**.

It is not overlapped by any proposed infrastructure. A section of access track traversing the adjacent conifer woodland runs parallel to this area, set back c. 40m from the bog. Turbine T8 is located c. 80m from this area of bog. A marginal area of this habitat is overlapped by the Proposed Wind Farm boundary south of T8. Further areas of this habitat (located south-east of the T8-T9 access track) are overlapped by the optioned lands boundary.

A marginal part of this area is overlapped by the Kilmury Coillte Biodiversity area.

Note on *Rhynchospora alba* vegetation

Similarly to the more intact raised bog described above, patches of *Rhynchospora alba* were recorded throughout this area of bog during current surveys. Similarly to the above, these do not correspond to Annex I habitat due to absence of the majority of indicator species, absence of well-developed vegetation communities, and occurrence in areas subject to historical disturbance.

As noted above, these areas are not within the footprint of any proposed infrastructure.

Plate 8-18: Intact (Drained) Raised Bog

Intact Bog Margin Remnant

A marginal area of Timahoe North Bog which was never harvested is present near the southern part of the Proposed Wind Farm. This habitat area is formed by mound of peat which rises above the adjacent agricultural land and cutover bog.

It is connected to and forms part of a grazed area comprised primarily of an adjacent field of GA1/GS2 grassland (used for horse grazing). Species present include Yorkshire fog, ling heather, creeping buttercup, mouse ear *Cerastium fontanum*, European gorse, bracken, heath-plait moss, red-stemmed feather moss *Pleurozium scherberei*, reindeer lichen and sphagnum mosses *S. capillifolium* and *S. subnitens* in waterlogged areas on top of the mound.

This area is mapped as bog in 1st edition ordnance survey mapping.

While it is an intact part of the original bog extent, it's limited size and disturbance of adjacent peatland means it is of **County Importance**.

It is not overlapped by any proposed infrastructure and is located outside the Proposed Wind Farm and optioned lands boundaries.

Plate 8-19: Intact Bog Margin Remnant

8.7.3.1.20 HH3 Wet heath

Areas of recolonising cutover bog to the east/south-east of T8 are representative of this habitat. The area is within a strip of cutaway bog surrounded by raised bog, bog woodland and conifer woodland.

Purple moor-grass is the dominant species; hare's-tail cottongrass, Yorkshire fog, lesser spearwort *Ranunculus flammula*, *Sphagnum papillosum*, and heath plait-moss are also present.

Due to it's potential to continue regenerating and contribute to suitable conditions for regeneration of surrounding raised bog areas, this habitat is of **Local Importance Higher value**.

This habitat, forming part of the habitat complex referred to as the 'Bog Pool Area' is an atypical example which represents an early successional stage in the recolonisation of previously bare cutover peat. The process of regeneration has begun and there is potential for this habitat to succeed to fen and eventually raised bog over very large timescales; however, this habitat is not representative of degraded raised bog capable of natural regeneration, as detailed in the he FI response submitted in 2019 clarifying the absence of links with Annex I habitat for this habitat type which noted the following:

" *This Annex I habitat* [Degraded raised bogs still capable of natural regeneration 7120] *contains species typical of active raised bogs with a higher prevalence of Trichophorum cespitosum and Narthecium ossifragum. Neither of these species were recorded at the bog pool area. The absence of typical raised bog species such as Calluna vulgaris, Erica tetralix, Drosera rotundifolia, Rhynchospora alba, lichen spp. and the presence of just one sphagnum species demonstrates that this habitat does not correspond with the aforementioned Annex I habitat. None of the species recorded during the relevés are present on the species list for this Annex I habitat, as outlined in the 'Interpretation Manual of European Union Habitats' (EC, 2013). Only two species recorded during the relevés are listed on the 28- species long list for this Annex I habitat as outlined in "The Status of EU Protected Habitats and Species in Ireland' (NPWS, 2019)*.

Furthermore, it is stated that in the Irish context this Annex I habitat does not include secondary degraded raised bog which relates to, among others, cutover bog. As the bog pool area is part of the adjacent cutover bog, this habitat does not correspond with the Annex 1 habitat."

This habitat is not overlapped by any proposed infrastructure. It is located c. 24m from T8 and c. 10m from the T8 hard standing footprint.

Plate 8-20: HH3 Wet heath

8.7.3.1.21 FL1 Dystrophic lake

A flooded cutaway area located near the central section of the Proposed Wind Farm which is in the process of infilling with vegetation corresponds to this habitat. The area is within a strip of cutaway bog surrounded by wet heath, raised bog, bog woodland, scrub and conifer woodland. This habitat forms part of the habitat complex referred to as the 'Bog Pool Area'.

Species in wetter parts include bulrush bulbous rush *Juncus bulbosus*, Bulrush *Typha latifolia*, marsh pennywort *Hydrocotyle vulgaris* and branched bur-reed *Sparganium erectum* (the latter two of which are indicative of elevated nutrient levels). Around the edge of the waterbody, purple moor-grass, soft rush and Sphagnum mosses are present. Large parts of this area contain *Sphagnum cuspidatum* and it is likely the entire waterbody will eventually be infilled due to colonisation by vegetation and return to peat forming conditions.

Branched bur-reed and bulrush are indicative of nutrient-rich water; bulrush and marsh pennywort are associated with rich fen. Marsh pennywort can also occur in bogs however, and as such is less strongly associated with rich fen. These species are in contrast with Soft rush and *S.cuspidatum* which are associated with acidic conditions.

The history of disturbance in this area contributes to this atypical plant assemblage; however, due to it's situation and the abundance of *S.cuspidatum* it is assessed to be an atypical example of a dystrophic lake. It is assessed that this habitat will succeed to fen, and potentially then succeed to raised bog over a very long time-scale.

Due to it's potential to regenerate and contribute to suitable conditions for regeneration of surrounding raised bog areas, this habitat is of **Local Importance Higher value**.

The FI response submitted in 2019 clarified the absence of links with Annex I habitat for this habitat type. The FI response noted the following:

"*As part of the habitat mapping for the EIAR the bog pool area was given the reference code FL1 (as per Fossitt, 20007) which corresponds to Dystrophic lakes. The bog pool habitat however does not correspond to the Annex I habitat of the same name. The Annex I habitat typically contains, inter alia, Utricularia spp., Rhynchospora alba, R. fusca and Hydrophorus spp. None of these species were recorded at the bog pool area. One sphagnum species was present, Sphagnum papillosum, however this species is not listed as typical for the Annex I habitat. The relevés recorded zero species listed as typical for the Annex I habitat and the previous EIAR surveys recorded just one - Juncus bulbosus. Therefore, given the species composition of the bog pool area, it can be concluded that bog pool area does not correspond with any Annex I habitat type*."

This habitat is not overlapped by any proposed infrastructure. It is located c. 20m from T8 and c. 5m from the T8 hard standing footprint.

Plate 8-21: FL1 Dystrophic lakes

8.7.3.1.22 WS1/PB1 Scrub/Raised bog Mosaic

An area of disturbed raised bog in the central part of the Proposed Wind Farm is bordered by raised bog and wet heath and Dystrophic lake to the south-east and by conifer woodland to the north-west.

There is an abundance of small to medium sized Sitka spruce and lodgepole pine invading this area. Ling is dominant in the shrub layer. Heath-plait moss is the dominant moss species. Reindeer lichen is also present. *S.capillifolium* hummocks are present in some areas but sphagnum cover is low overall.

The abundance of invading conifers, dominance of heath-plait moss over sphagnum and high, leggy growth habit of ling are indicative of desiccation caused by peat harvesting and drainage in adjacent areas.

Due to desiccation, disturbance and colonisation by non-native trees, this habitat type is **Local Importance Higher value**.

It is located c. 18m from the proposed T8 location, and c. 4m from the proposed T8 hard standing footprint. It is overlapped by the T8 bat felling buffer.

Plate 8-22: WS1/PB1 Scrub/Raised bog Mosaic

8.7.3.1.23 WD3/PB1 Conifer woodland/Raised bog Mosaic

This habitat mosaic is present to the west of the proposed access road leading south to T8. It is characterised by scattered lodgepole pine trees, with occasional downy birch interspersed with open spaces dominated by a dense growth of ling heather.

It originates from colonisation of an area of drained but intact raised bog by lodgepole pine, in addition to profuse ling growth typical of drained raised bog.

This mosaic is **Local Importance Higher value**.

It is not overlapped by any proposed infrastructure.

This area is overlapped by the Kilmurry Coillte Biodiversity area. It is broadly characteristic of the identified Coillte management goal for this area, namely creation of open woodland on the drained raised bog.

Plate 8-23: WD3/PB1 Conifer woodland/Raised bog Mosaic

8.7.3.1.24 WL1 Hedgerows

Hedgerows are present in the north and south of the Proposed Wind Farm.

Hedgerow comprised of hawthorn, hazel, ivy and grey willow is present along the existing northern Coillte access track. A section of hedgerow in this area is also comprised of invasive cherry laurel *Prunus laurocerasus*. A self-seeded hedgerow comprised of downy birch is present in the south of the site. Hawthorn is the most frequent component of hedgerows across the site.

This habitat is **Local Importance Higher value**.

Hedgerows are overlapped or intersected by proposed internal access tracks, construction access roads, T1 hard standing and grid connection. They are also present along the existing local road forming part of the proposed construction traffic access connection between the northern and southern sections of the Proposed Wind Farm.

Plate 8-24: WL1 Hedgerows

8.7.3.1.25 WL2 Treelines

A treeline comprised of mature pedunculate oak left standing after surrounding conifer plantation was felled is present near T11.

An ash and hawthorn treeline is present between the immature oak plantation and conifer plantation traversed by the proposed northern site access road.

A mature ash treeline is present along and both sides of an existing farm access track to the north of T2. Other species include field rose, guelder rose *Viburnum opulus*, hawthorn hazel, grey willow, whych elm *Ulmus glabra*, wild privet *Ligustrum vulgare* and wild plum.

This habitat is **Local Importance Higher value**.

The oak treeline is entirely within the T11 bat felling buffer, and another section of treeline in agricultural land is within the T1 felling buffer. The northern site access road intersects a treeline separating immature oak plantation and conifer woodland.

Plate 8-25: WL2 Treelines

8.7.3.1.26 WL1/WL2 Hedgerows/Treelines Mosaic

The majority of field boundaries are comprised of hedgerow/treeline mosaic. The dominant species is typically ash, with mature beech trees also present in some sections. These larger trees are interspersed with or alternate with sections of lower-growing trees including wild plum, hawthorn and holly, while other species including bramble, guelder rose and field rose form an understory thicket.

This habitat is **Local Importance Higher value**.

This mosaic is overlapped or intersected by proposed internal access tracks and T4/T5 hard standings. It is overlapped by the T4 and T5 bat felling buffers. This mosaic is also present along the existing local road forming part of the proposed construction traffic access connection between the northern and southern sections of the Proposed Wind Farm.

Plate 8-26: WL1/WL2 Hedgerows/Treelines Mosaic

8.7.3.1.27 FW2 Depositing/lowland rivers

This habitat is present in the southern part of the Proposed Wind Farm, where the Fear English River flows through agricultural land in the vicinity of T1-T3, and along the interface between agricultural land and woodland near T4 and T5. It is joined by tributaries to the south-east and north-west of T4/T5. The banks of these rivers are steep, sparsely vegetated banks, and many sections of the river are similar to agricultural drains due to historical canalisation.

The riverbed is heavily silted. Wet width averages c. 1-2 m, while depth ranges from c. 20-40cm.

These watercourses are bounded by hedgerows and woodland, with numerous livestock access points in agricultural areas.

Due to it's high connectivity/corridor value, this habitat is rated as **Local Importance Higher value**.

This habitat is intersected at three separate points by proposed internal access track crossings. Proposed Wind Farm infrastructure is located in catchment.

Plate 8-27: FW2 Depositing/lowland rivers

8.7.3.1.28 FW4 Drainage ditches

Numerous drains are present at the site, ranging from small forestry and bog drains to large drains associated with former peat harvesting areas and agricultural lands.

Floating sweetgrass *Glyceria fluitans* and duckweed *Lemna* Sp. were noted in one large bog drain. Colonisation of smaller bog drains by sphagnum was also noted in some locations. Historical fly tipping was also noted in one drain.

This habitat is **Local Importance Higher value**.

Drainage ditches are intersected by proposed access roads, and overlapped by the T5 hard standing and T4/T5 bat felling buffers.

Plate 8-28: FW4 Drainage ditches

8.7.3.2 Annex 1 Appraisal

As noted above, the intact raised bog south of T9/T10 (Mulgeeth Bog) corresponds to the Annex I priority habitat “active raised bog [7110]”, due to the high degree of wetness, typical species, large extent, high sphagnum cover in parts, low number and ineffectiveness of drains, this area is classified as active raised bog and as such corresponds to the Annex I priority habitat “active raised bog [7110]”. The drained intact raised bog described above is in less favourable condition but still retains a high degree of naturalness and as such has links with the Annex I habitat "Degraded raised bogs still capable of natural regeneration [7120]". This habitat is not representative of the Annex I habitat "Depressions on peat substrates of the Rhynchosporion [7150]".

A previous Annex I assessment of the raised bog south of the proposed location of turbine T9 and turbine T10 was carried out on 22/08/2014. Two relevés were undertaken to record in detail flora species and respective cover of each present. In summary this assessment found that the high bog present at the location is a remnant of a more extensive degraded/cutover raised bog which still has active raised bog (sphagnum cover >50%). The edge of the high bog is not defined by a face bank and the high bog surface has no drains; therefore, it corresponds to the Annex I priority habitat “active raised bog [7110]”. This habitat, located outside the Proposed Wind Farm boundary, is of high conservation value. The results of current surveys remain consistent with this assessment.

8.7.3.3 Turbine Delivery Route

The habitats along the TDR are Buildings and Artificial Surfaces (BL3) (roads), Amenity grassland GA2, Spoil and bare ground/Ornamental-non-native shrub Mosaic ED2/WS3, Scrub WS1, Hedgerows WL1, Treelines WL2, Hedgerow/Treeline Mosaic WL1/WL2 and Dry meadows and grassy verges (GS2).

The TDR 'points of interest' (POIs) are locations where interventions are required to accommodate the passage of turbine components. With regard to potential ecological impacts, interventions such as tree canopy trimming, tree removal, vegetation trimming and installation of load bearing surfaces on unpaved areas are the key activities of interest. The POIs are listed below along with a summary of habitats and proposed activities at each POI.

Table 8-11: TDR POI Habitat Summary

POI	Description	Habitat Notes	Notes/Potential for Ecological Impacts
1	M4 Junction 9 Slip Road	Amenity grassland GA2 on roundabout and road verges. **Local Importance (Lower Value).** Hedgerow WL1 along south-eastern edge of roundabout - roadside landscape planting. Grey alder *Alnus incana*, downy birch, pedunculate oak, hazel, cherry laurel. **Local Importance (Higher Value).**	Load bearing surface required on GA2. Vegetation trimming will affect WL1.
2	R402 / Johnstown Road Roundabout	Ornamental/non-native shrub WS3 & Spoil and bare ground ED2. Landscaped roundabout - one central cherry tree, ornamental shrub planting surrounded by gravel. Pampas grass *Cortaderia selloana*, David viburnum *Viburnum davidii*, Fortune's spindle *Euonymous fortunei*, Wilson's honeysuckle *Lonicera nitida*, *Hypericum* 'Hidcote', cherry *Prunus* Sp., ash seedlings, grey willow, cleavers *Gallium aparine*, groundsel *Senecio vulgaris*. **Local Importance (Lower Value).**	Removal of shrubs and small cherry tree required for load bearing and oversail.
3	R402 / L5025 Access Junction	Dry meadows and grassy verges GS2 along road verge. Yorkshire fog, false oat-grass, creeping thistle. **Local Importance (Lower Value).** Scrub WS1 is also present - grey willow, privet, downy birch, cherry laurel bramble. **Local Importance (Higher Value).**	GS2 potentially subject to disturbance during removal of roadside barrier. Vegetation trimming will affect WS1.

POI	Description	Habitat Notes	Notes/Potential for Ecological Impacts
4	L5025 Bend 1	Hedgerow/Treeline Mosaic WL1/WL2. Ash, hawthorn, ivy. **Local Importance (Higher Value).**	Minimal tree canopy trimming for load clearance will affect WL1/WL2.
5	L5025 Bend 2	Hedgerow/Treeline Mosaic WL1/WL2. Ash, sycamore, hawthorn, ivy. **Local Importance (Higher Value).**	Minimal tree canopy trimming for load clearance will affect WL1/WL2.
6	L5025, north of the River Kilooney Bridge	Treeline WL2. Ash, sycamore, hawthorn, ivy. **Local Importance (Higher Value).**	Minimal tree canopy trimming for load clearance will affect WL1/WL2.
7	L5025, south of the River Kilooney Bridge	Hedgerow WL1. Ash, hawthorn, ivy, bramble, privet. Treeline WL2. Beech, sycamore, ash, ivy, lodgepole pine, Wilson's honeysuckle. **Local Importance (Higher Value).**	Minimal tree canopy trimming for load clearance will affect WL1 & WL2.
8	Southern Site Access Junction	Hedgerow WL1. Low cut hedge. Hawthorn, wild plum, elder, guelder rose, ivy, bramble, yarrow, cocksfoot grass. **Local Importance (Higher Value).**	A section of this hedgerow will be removed to create the main (southern) site entrance.
9	R402 Raven Junction	Dry meadows and grassy verges GS2 at junction. Recently cut. Yorkshire fog, creeping buttercup, white clover, dandelion, hogweed. Hedgerow/Treeline Mosaic WL1/WL2 along L5012 after junction. Larch *Larix* Sp., ash, hawthorn. Hedgerow WL1. Low-cut hawthorn hedgerow at junction. **Local Importance (Higher Value).**	Vegetation at junction potentially affected by vegetation trimming. Minimal tree canopy trimming for load clearance will affect WL1/WL2.

POI	Description	Habitat Notes	Notes/Potential for Ecological Impacts
10	Kilshanroe Road Bend 1	Hedgerow/Treeline Mosaic WL1/WL2 along L5012 after junction. Ash, hawthorn, elder. **Local Importance (Higher Value).**	Minimal tree canopy trimming for load clearance will affect WL1/WL2.
11	Kilshanroe Road Bend 2	Hedgerow/Treeline Mosaic WL1/WL2 along L5012 after junction. Ash, hawthorn, elder, ivy, cleavers, cow parsley *Anthriscus sylvestris*. **Local Importance (Higher Value).**	Minimal tree canopy trimming for load clearance will affect WL1/WL2.
12	Kilshanroe Road Bend 3	Hedgerow WL1. Low-cut hedgerows with hawthorn, elder, hazel, bramble and ivy. Elm *Ulmus* Sp. and ash tree standing side by side in one location. **Local Importance (Higher Value).**	Minimal tree canopy trimming for load clearance will affect roadside trees. Vegetation trimming will affect WL1.
13	Kilshanroe Road Bend 4	Hedgerow/Treeline Mosaic WL1/WL2 along L5012. Ash, hawthorn, pedunculate oak. **Local Importance (Higher Value).**	Minimal tree canopy trimming for load clearance will affect WL1/WL2.
14	Kilshanroe Road Bend 5	Hedgerow/Treeline Mosaic WL1/WL2 along L5012. Ash, hawthorn, sycamore. **Local Importance (Higher Value).**	Minimal tree canopy trimming for load clearance will affect WL1/WL2.
15	Northern Site Access	Hedgerow/Treeline Mosaic WL1/WL2 along L5012. Ash, hawthorn, pedunculate oak. **Local Importance (Higher Value).**	Minimal tree canopy trimming for load clearance and tree removal at site entrance will affect WL1/WL2.

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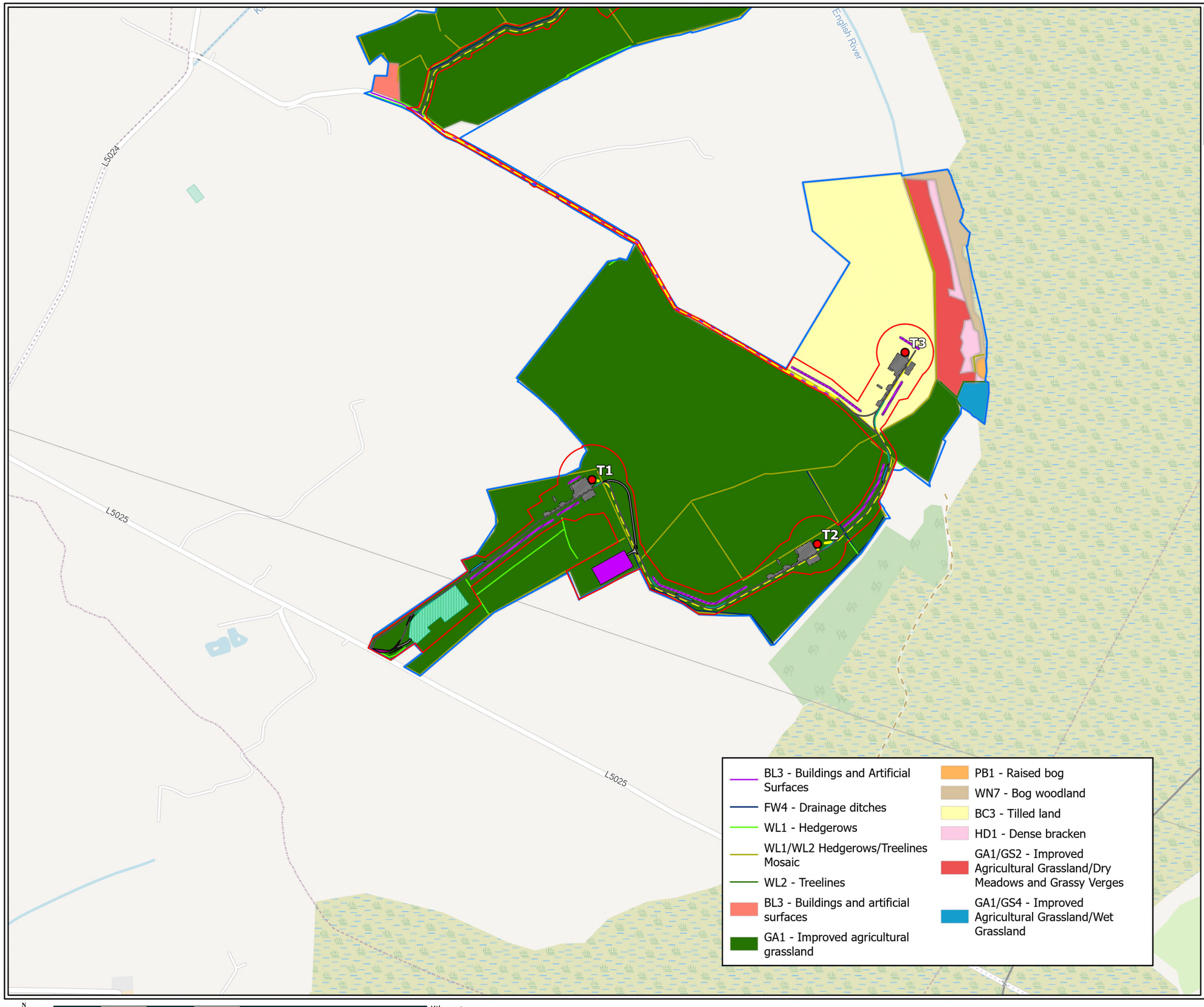

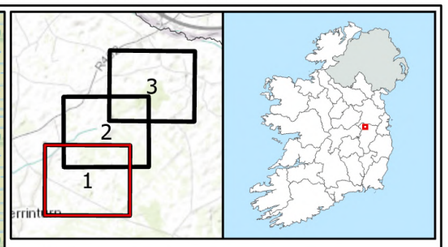

Legend

- Proposed Development Boundary
- Study Area Boundary
- Road widening - Access tracks
- Road widening - Temp. Access Tracks
- Access Track
- Temporary Access Track
- Blade Transfer Area
- Construction Compound
- Passing Bays
- Turbine Hardstanding
- Berms
- Cable Route
- Turbines

- BL3 - Buildings and Artificial Surfaces
- FW4 - Drainage ditches
- WL1 - Hedgerows
- WL1/WL2 Hedgerows/Treelines Mosaic
- WL2 - Treelines
- BL3 - Buildings and artificial surfaces
- GA1 - Improved agricultural grassland
- PB1 - Raised bog
- WN7 - Bog woodland
- BC3 - Tilled land
- HD1 - Dense bracken
- GA1/GS2 - Improved Agricultural Grassland/Dry Meadows and Grassy Verges
- GA1/GS4 - Improved Agricultural Grassland/Wet Grassland

N W E S

0 0.25 0.5 1 Kilometers

TITLE: Habitat Map Page 1

PROJECT: Drehid Wind Farm and Substation

FIGURE NO:	8.9		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:10,000	**REVISION:**	0
DATE:	12/05/2025	**PAGE SIZE:**	A3

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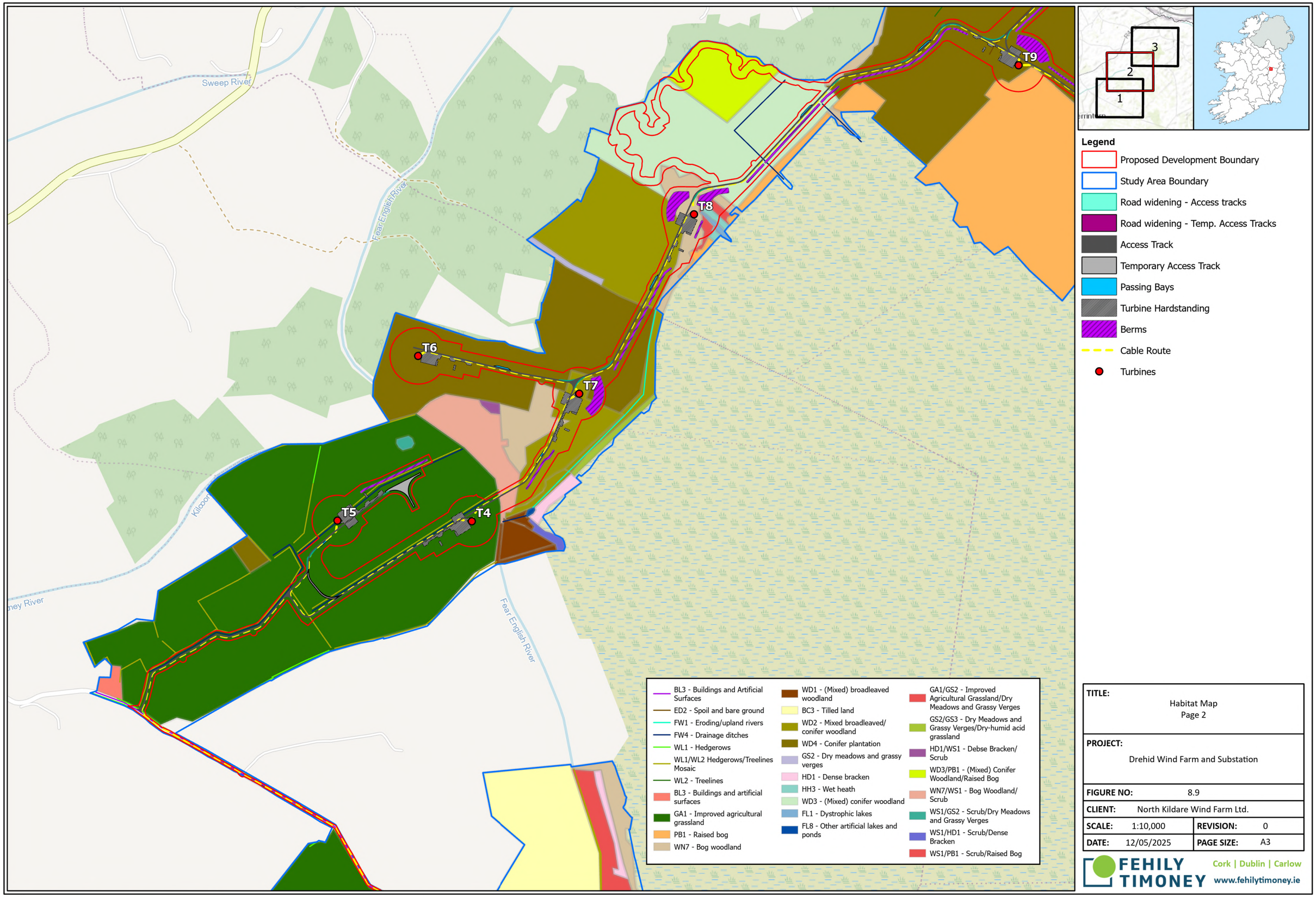

TITLE:	Habitat Map Page 2
PROJECT:	Drehid Wind Farm and Substation
FIGURE NO:	8.9
CLIENT:	North Kildare Wind Farm Ltd.
SCALE:	1:10,000
REVISION:	0
DATE:	12/05/2025
PAGE SIZE:	A3

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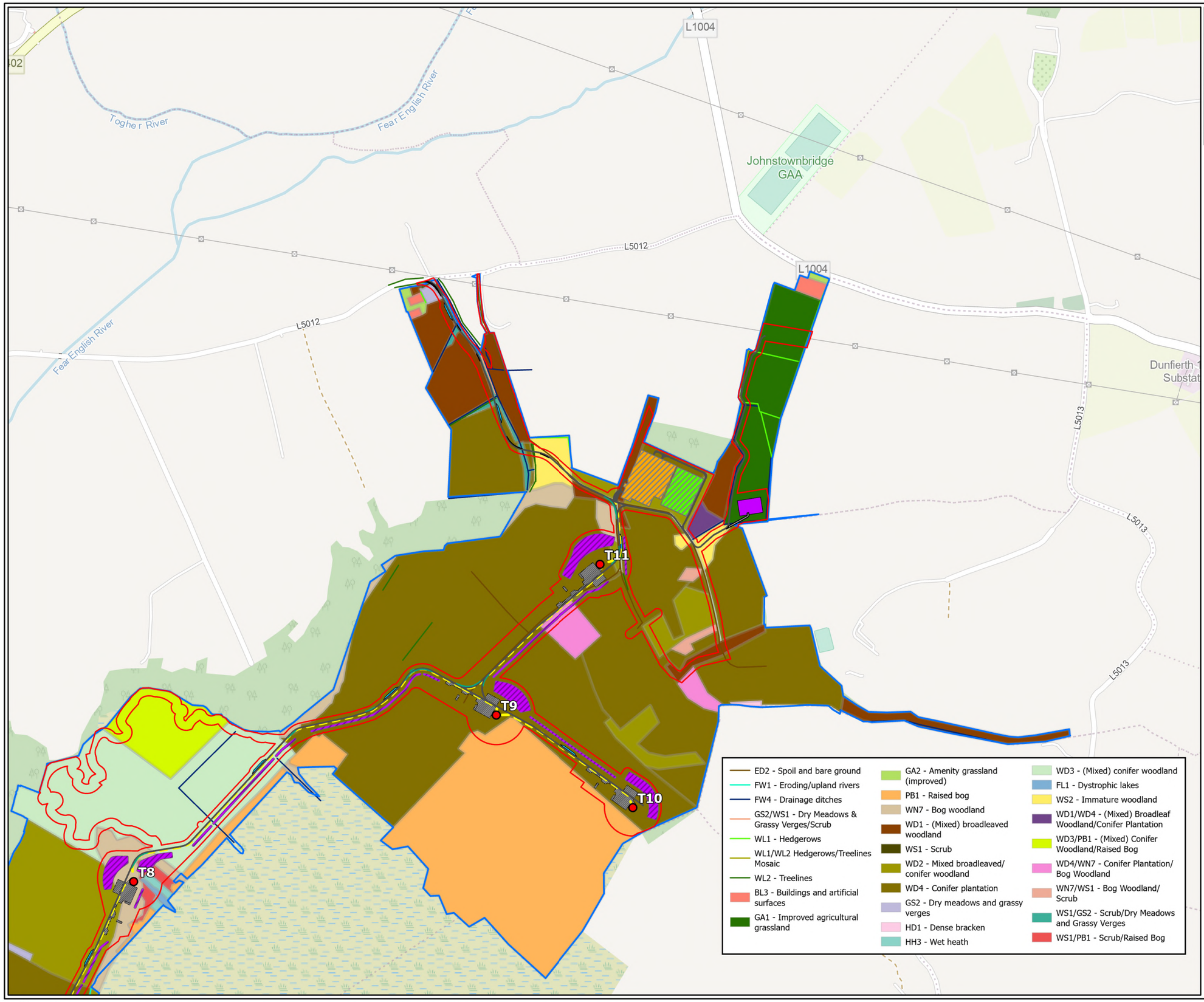

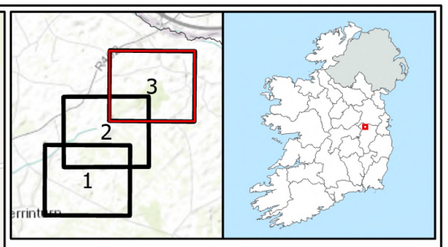

Legend

- Proposed Development Boundary
- Study Area Boundary
- Road widening - Access tracks
- Road widening - Temp. Access Tracks
- Access Track
- Temporary Access Track
- Construction Compound
- Passing Bays
- Turbine Hardstanding
- Berms
- Peat Deposition Area
- Substation
- Cable Route
- Turbines

- ED2 - Spoil and bare ground
- FW1 - Eroding/upland rivers
- FW4 - Drainage ditches
- GS2/WS1 - Dry Meadows & Grassy Verges/Scrub
- WL1 - Hedgerows
- WL1/WL2 Hedgerows/Treelines Mosaic
- WL2 - Treelines
- BL3 - Buildings and artificial surfaces
- GA1 - Improved agricultural grassland
- GA2 - Amenity grassland (improved)
- PB1 - Raised bog
- WN7 - Bog woodland
- WD1 - (Mixed) broadleaved woodland
- WS1 - Scrub
- WD2 - Mixed broadleaved/ conifer woodland
- WD4 - Conifer plantation
- GS2 - Dry meadows and grassy verges
- HD1 - Dense bracken
- HH3 - Wet heath
- WD3 - (Mixed) conifer woodland
- FL1 - Dystrophic lakes
- WS2 - Immature woodland
- WD1/WD4 - (Mixed) Broadleaf Woodland/Conifer Plantation
- WD3/PB1 - (Mixed) Conifer Woodland/Raised Bog
- WD4/WN7 - Conifer Plantation/ Bog Woodland
- WN7/WS1 - Bog Woodland/ Scrub
- WS1/GS2 - Scrub/Dry Meadows and Grassy Verges
- WS1/PB1 - Scrub/Raised Bog

N W E S

0 0.25 0.5 1 Kilometers

TITLE: Habitat Map Page 3

PROJECT: Drehid Wind Farm and Substation

FIGURE NO:	8.9		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:10,000	**REVISION:**	0
DATE:	12/05/2025	**PAGE SIZE:**	A3

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8.7.4 Rare/Protected Botanical Species

The Proposed Wind Farm lies within Ordnance Survey National Grid 10 km Square N73. This 10 km grid square was searched for records of protected plant species, and the 2 km grid squares (tetrads) within N73 were also interrogated to provide higher resolution records for species of interest. This list was then compared to the lists of species protected under the Flora (Protection) Order of 2022 and the Ireland Red List No. 10: Vascular Plants (Wyse et al. 2016). Table 8-12 presents details of the rare and protected plant species found within the 10 km square N73. NPWS Flora Protection Order (FPO) mapping for bryophytes and vascular plants was also consulted. The NPWS National Survey of Native Woodlands (NSNW) dataset was also examined.

One record for a species designated as "Near Threatened" was returned: Corn marigold *Glebionis segetum*. This record is from a domestic property c. 600m north of the Proposed Wind Farm. Corn marigold is a common constituent of wildflower seed mixes, and due to it's location in a domestic setting and lack of other records in the area, this contemporaneous record (2019) is considered likely to have been planted at this location. Corn marigold was not recorded during botanical surveys at the Proposed Wind Farm.

One record for a 'Vulnerable' species was returned: Alder buckthorn *Frangula alnus*, located c. 2.7km east of the Proposed Wind Farm. This species was not recorded during botanical surveys at the Proposed Wind Farm. It is noted that common buckthorn *Rhamnus cathartica* was recorded in recolonising cutover bog near the Proposed Wind Farm site, and there are similarities between the habitat preferences of these two species.

The presence of one Annex V species- Large white-moss *Leucobryum glaucum* was indicated by NPWS Article 17 reporting. There are no records of this species overlapping the Proposed Wind Farm; the closest records are located in 1 km grid squares N7234 and N7432 which lie respectively c. 1 km and c. 960m west and south of the Proposed Wind Farm. Large white-moss was not recorded during botanical surveys at the Proposed Wind Farm. Large white moss is not threatened, being currently assessed as 'Favourable'. Annex V species are those of community interest whose taking in the wild and exploitation may be subject to management measures.

FPO mapping indicates the presence of a record for the FPO (2022) species Bog orchid *Hammarbya paludosa* in cutover bog/drained raised bog c. 60-80m east of the Proposed Wind Farm. However this record is not contemporaneous, dating from 1894, prior to the industrial strip mining of raised bogs initiated by Bord Na Móna in the mid 1940's. Bog orchid, a species of wet, open acidic *Sphagnum* bog, was not recorded during botanical surveys at the Proposed Wind Farm.

NPWS National Survey of Native Woodlands (NSNW) shapefiles indicate a mixed stand of non-Annex Bog woodland and Oak-ash-hazel woodland directly southwest of turbine 2. The presence of bog woodland in this area is consistent with the occurrence of this habitat in other parts of the study area where Drehid Bog transitions to agricultural land, and the presence of oak-ash-hazel woodland demonstrates the climax woodland community which develops on drier soils in this area.

Species identification was completed using; Webb's 'An Irish Flora', 8th edition, 2012., F. Rose 'The Wild Flower Key', Revised edition, 1981, and The British Bryological society's 'Mosses and Liverworts of Britain and Ireland a field guide', first edition, 2010.

No rare or protected species were recorded during site surveys. No FPO (Flora Protection Species) were noted within the Proposed Wind Farm or surrounding areas.

Table 8-12: Rare/Protected Flora: Desktop Results

Common Name	Grid Square	Location of closest Record	Year of Last Record	Survey	Conservation Status	Habitat	Result of surveys for Drehid
Alder buckthorn *Frangula alnus*	N73	N773 339 – c. 2.7km east of Proposed Wind Farm	2015	National Vegetation Database Data from NBDC - Online Atlas of Vascular Plants 2012-2020	Threatened Species: Vulnerable	Limestone pavement, hedgerow, fens and boggy places. In fen carr areas, in damp woodland, heaths on acid soils (rare on calcareous soils) (Rose, 2006)	Species not found within study area
Large white cushion moss *Leucobryum glaucum*	N73	N7234 – c. 1 km west of Proposed Wind Farm	2012	Bryophytes of Ireland	EU Habitats Directive Annex V. Overall conservation status 'Favourable' (Lockhart, N., et al, 2012).	Broad ecological range, common habitats are acidic woodland and mires, from wet heath through to valley mires, raised bogs and even fens (BBS, 2010).	Species not found within study area

Common Name	Grid Square	Location of closest Record	Year of Last Record	Survey	Conservation Status	Habitat	Result of surveys for Drehid
Bog orchid *Hammarbya paludosa*	N73	c. 60-80m east of the Proposed Wind Farm	1894	NPWS Rare/Threatened Plants Database	FPO (2022); Threatened Species: Near Threatened	Wet, open acidic Sphagnum bog	Species not found within study area
Corn marigold *Glebionis segetum*	N73	c. 600m north of Proposed Wind Farm.	2019	Vascular plants: Online Atlas of Vascular Plants 2012 Onwards	Threatened Species: Near Threatened	Disturbed/waste ground, arable weed of light sandy soils	Species not found within study area

8.7.5 Invasive Plant Species

8.7.5.1 Desktop Records

The invasive species listed in Table 8-13 have been recorded within 10 km grid square N73. Japanese knotweed (*Fallopia japonica*), sycamore (*Acer pseudoplatanus*), rhododendron ponticum, butterfly-bush and cherry laurel (*Prunus laurocerasus*) were the only invasive plant species noted in records within N73.

Table 8-13: Invasive Species within 10 km grid square N73 and 1 km grid squares overlapping TDR(Source: NBDC)

Common Name	Scientific Name	Year of Last Record	Location of Record	Legal status	Invasive Impact
Wind Farm/Substation					
Sycamore	*Acer pseudoplatanus*	2020	N765 384 – c. 380m north of Proposed Wind Farm	None	Medium Impact
Cherry Laurel	*Prunus laurocerasus*	2005	N710 345 - c. 2km west of Proposed Wind Farm	None	High Impact
Rhododendron	*Rhododendron ponticum*	2022	c. 100m east of Proposed Wind Farm/c. 170m north-east of T9 In woodland c. 25m from access track south of T8	Schedule III	High Impact
Japanese Knotweed	*Fallopia japonica*	2021	N733 393 - c. 2.8 km north-west of Proposed Wind Farm	Schedule III	High Impact
Butterfly-bush	*Buddleja davidii*	2019	N760 373 - overlapping existing access track north of T9 N766 375 & N766 374 - c. 230m south of proposed substation	None	Medium Impact

Common Name	Scientific Name	Year of Last Record	Location of Record	Legal status	Invasive Impact
TDR					
Cherry Laurel	*Prunus laurocerasus*	2005	N7134	None	High Impact
Sycamore	*Acer pseudoplatanus*	2005	N7134	None	Medium Impact

8.7.5.2 Invasive Species Recorded During Surveys

An individual *Rhododendron ponticum* bush c. 2 x 3m in extent was recorded in mixed broadleaved/conifer woodland adjacent to a section of proposed access track south of T8. This Schedule III invasive species was also recorded in conifer plantation c. 170m north-east of T9, as indicated by the desktop record above.

Sycamore was recorded within mixed broadleaved/conifer woodland within the proposed substation footprint, and was noted to be common in open parts of recently replanted conifer plantation to the south of the proposed substation. It was also recorded in hedgerows at TDR points of interest.

Butterfly bush was recorded along existing forestry tracks north of T9 and south of the proposed substation.

Cherry laurel was recorded at two TDR points of interest (POI 1 & 3).

Snowberry (Symphoricarpos albus), another invasive species, was identified during ecological survey. This record is c. 15m from the proposed T7 - T8 access track. Snowberry is a medium impact invasive species.

The presence of regenerating Lawson cypress in a block of conifer woodland was noted. This non-native species has not been assessed to date in terms of invasiveness, but has been observed to spread successfully in forestry plantations.

Table 8-14: Invasive Species recorded onsite

Common Name	Scientific Name	Location of Record	Legal status	Invasive Impact
Sycamore	*Acer pseudoplatanus*	In substation footprint and replanted conifer blocks in north of site TDR POIs: 5, 6, 7 & 14	None	Medium Impact
Cherry Laurel	*Prunus laurocerasus*	Existing Coillte entrance in north (adjacent domestic property boundary) TDR POIs: 1 & 3	None	High Impact

Common Name	Scientific Name	Location of Record	Legal status	Invasive Impact
Rhododendron	*Rhododendron ponticum*	c. 100m east of Proposed Wind Farm/c. 170m north-east of T9 In woodland c. 25m from access track south of T8	Schedule III	High Impact
Butterfly-bush	*Buddleja davidii*	N760 373 - overlapping existing access track north of T9 N766 375 & N766 374 - c. 230m south of proposed substation	None	Medium Impact
Snowberry	*Symphoricarpos albus*	ITM 0674913 0736546 - c. 15m from proposed T7 - T8 access track	None	Medium Impact

8.7.6 Terrestrial Mammals (excluding bats)

8.7.6.1 Desktop Study

In addition to mammal surveys, a desktop review of information available from the National Biodiversity Data Centre (NBDC) indicates that the following species have been observed within the 10 km grid square (N73) in which the Proposed Wind Farm is located: badger (*Meles meles*), pygmy shrew (*Sorex minutus*), red squirrel (*Sciurus vulgaris*), otter (*Lutra lutra*), Irish hare (*Lepus timidus* subsp. *Hibernica*), Irish stoat (*Mustela erminea* subsp. *Hibernica*), pine marten (*Martes martes*), red deer (*Cervus elaphus*), red fox (*Vulpes Vulpes*), hedgehog (*Erinaceus europaeus*) and wood mouse (*Apodemus sylvaticus*). See Table 8-15 below for more information.

Table 8-15: Desktop results of mammals within and adjacent to the Proposed Wind Farm (NBDC records within 10 km grid square N73) and 1 km grid squares overlapping TDR

Mammal Name	Legal Protection	Conservation Status (Marnell et al. 2019)	Location
Wind Farm/Substation			
Badger (*Meles meles*)	Wildlife Acts	Least Concern	N73
Hedgehog (*Erinaceus europaeus*)	Wildlife Acts	Least Concern	N73
Irish hare (*Lepus timidus* subsp. *Hibernica*)	EU Habitats Directive Annex V, Wildlife Acts	Least Concern	N73
Irish stoat (*Mustela erminea* subsp *hibernica*)	Wildlife Acts	Least Concern	N73
Otter (*Lutra lutra*)	EU Habitats Directive Annex II & Annex IV Wildlife Acts	Least Concern	N73
Pine marten (*Martes martes*)	EU Habitats Directive Annex V, Wildlife Acts	Least Concern	N73
Pygmy shrew (*Sorex minutus*)	Wildlife Acts	Least Concern	N73
Red deer (*Cervus elaphus*)	Wildlife Acts	Least Concern	N73
Red fox (*Vulpes Vulpes*)	None	Least Concern	N73
Red squirrel (*Sciurus vulgaris*)	Wildlife Acts	Least Concern	N73
Wood mouse (*Apodemus sylvaticus*)	None	Least Concern	N73
TDR			
Badger (*Meles meles*)	Wildlife Acts	Least Concern	N7135
Irish hare (*Lepus timidus* subsp. *Hibernica*)	EU Habitats Directive Annex V, Wildlife Acts	Least Concern	N7437
Red fox (*Vulpes Vulpes*)	None	Least Concern	N7437 N7640
Otter (*Lutra lutra*)	EU Habitats Directive Annex II & Annex IV Wildlife Acts	Least Concern	N7438
Hedgehog (*Erinaceus europaeus*)	Wildlife Acts	Least Concern	N7438

8.7.6.2 Invasive Mammals

The desktop review of information available from the National Biodiversity Data Centre (NBDC) indicate that six invasive mammal species have been observed within the 10 km grid square (N73): American mink (*Mustela vison*), brown rat (*Rattus norvegicus*), grey squirrel (*Sciurus carolinensis*), rabbit (*Oryctolagus cuniculus*), fallow deer (*Dama dama*) and house mouse (*Mus musculus*). See Table 8-16 below for more information.

Table 8-16: Desktop results of invasive mammals within and adjacent to the Proposed Wind Farm (NBDC records within 10k m grid square N73)

Mammal Name	Legislation	Conservation Status (Marnell et al. 2019)	Invasiveness (NBDC)
American mink (*Mustela vison*)	Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011. (Note: Regulation 50 not yet enacted).	None	High Impact
Brown rat (*Rattus norvegicus*)	Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011. (Note: Regulation 50 not yet enacted).	None	High Impact
Grey squirrel (*Sciurus carolinensis*)	Third Schedule listed species under Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011. (Note: Regulation 50 not yet enacted). Regulated invasive species of Union concern under the European Regulation on the prevention and management of the introduction and spread of invasive alien species [1143/2014].	None	High Impact
Rabbit (*Oryctolagus cuniculus*)	None	Least Concern	Medium Impact
Fallow deer (*Dama dama*)	Wildlife Acts Specified provisions of Regulations 49 & 50 in the European Communities (Birds and Natural Habitats) Regulations 2011 in Republic of Ireland apply to this species (NB Regulation 50 not yet commenced).	Least Concern	High Impact
House mouse (*Mus musculus*)	None	Least Concern	High Impact

8.7.6.3 Previous Mammal Surveys

Previous surveys noted badger activity across the Proposed Wind Farm, and also located a number of setts. Otter signs were also noted within the study area. Other species recoded during previous surveys were Irish hare, wood mouse, deer species, red fox, red squirrel, pine marten, and rabbits. Additionally, potential habitats for hedgehog, Irish stoat, pygmy shrew, and red deer were noted. Numerous field signs indicative of mammal activity such as prints, scat, and burrows, were recorded during previous surveys.

8.7.6.4 Current Mammal Surveys (2024)

During current mammal surveys the following species and/or their field signs were observed within or adjacent to the Proposed Wind Farm: badger, otter, fox, red squirrel, pine marten, wood mouse, Irish hare, red deer, Irish stoat and rabbit (an invasive species). Some deer signs including a small proportion of the trails and droppings observed were not definitively attributed to particular species. Of the 10 species identified, all are of 'Least Concern'. One (rabbit) is an invasive species. While not observed during surveys, species such as hedgehog and pygmy shrew are also likely to occur on site. See Table 8-17 and Figure 8-10 below for more information. Deer droppings were abundant across the site and as such are not mapped. Please see the confidential badger report which accompanies this application for details and photos of setts.

Table 8-17: Mammals and associated field signs observed within the study area

Species	Field Signs	Direct Observations
Badger	Snuffles Scat Latrines Trails Hair Setts	Trail Camera Footage
Otter	Spraints Prints Holts	None
Fox	Scat	None
Red Squirrel	Feeding signs	None
Pine marten	Scat	Trail Camera Footage
Wood mouse	None	Trail Camera Footage
Irish hare	None	Live sightings
Red deer	Droppings	Live sighting

Species	Field Signs	Direct Observations
	Tracks/Prints Antler Hair	
Deer species	Droppings Tracks/Prints	None
Rabbit	Burrows	None
Irish stoat	Prints	None

8.7.6.4.1 Badger

Badger activity was recorded across the Proposed Wind Farm, with signs of badger in widely distributed across the site, but absent from very wet peatland habitats. Snuffle holes were common in wooded areas, and latrines/scat were common, most often associated with sett entrances but also in several instances functioning as territorial markers. Well-defined trails were recorded in a number of locations, and badger hair was observed snagged in fencing intersecting a trail. Trail camera video footage of badgers was also recorded at a number of locations.

A total of 21 setts were recorded during current surveys, including one inactive potential outlier sett which is classified as such on a precautionary basis. A total of five main setts are present, indicative of five family groups/territories. The majority of setts observed are in woodland or scrub, with some also located in hedgerows/treelines running through agricultural land.

The locations of these setts relative to proposed infrastructure are detailed in Table 8-18. Exact locations are included in the confidential badger mitigation report which accompanies this application.

Further setts in the wider area were recorded during previous surveys. These are detailed in Table 8-19 to provide additional information on badger activity at the landscape scale. Setts A and B are likely to be in the same territory as Setts 7 and 8. Setts C and D could potentially be within the same territory as Setts 19 - 21; however, they may also be within a different territory .

The badger population and density of family group territories is notably high in this area.

Table 8-18: Badger setts including relative distances to infrastructure

Sett No.	No. of entrances	Activity	Type	Closest Infrastructure/Activities	Notes
1	1	Active	Subsidiary	Proposed access track (25m)	N/A
2	1	Active	Subsidiary	Proposed access track (20m)	N/A
3	7	Active	Main	Existing access track to form part of site access route (115m) Substation compound (250m)	N/A
4	3	Active	Annex	Access track (1m) Overlapped by access track felling buffer.	N/A
5	5	Inactive	Annex	Access track (12m) Access track felling buffer (5m)	N/A
6	11	Active	Main	Access track (158m)	N/A
7	2	Active	Annex	Hard stand (overlaps sett)	N/A
8	1	Active	Subsidiary	Hard stand (83m) Turbine felling buffer (20m)	N/A
9	2/4	Active	Subsidiary	Hard stand (590m)	2 disused entrances c. 18m from 2 active entrances - potentially same sett or separate sett.
10	4	Active	Main	Hard stand (623m)	N/A
11	3	Active	Annex	Hard stand (607m)	N/A
12	1	Active	Subsidiary	Hard stand (461m)	N/A
13	1	Inactive	Outlier	Hard stand (252m)	N/A
14	1	Inactive	Outlier (potential)	Turbine felling buffer (76m) Access track (89m)	Potential sett, included on precautionary basis
15	5	Active	Main	Access track (89m) Turbine felling buffer (147m)	N/A

Sett No.	No. of entrances	Activity	Type	Closest Infrastructure/Activities	Notes
16	1	Active	Subsidiary	Access track (137m) Hard stand (186m)	N/A
17	1	Active	Subsidiary	Access track (101m) Hard stand (126m)	N/A
18	4	Inactive	Annex	Access track (127m) Hard stand (155m)	Fresh digging by smaller mammal near sett
19	15-17	Active	Main	Access track (10m) Site compound (24m)	High number of entrances, some dug out from inside onto vertical bank not used for access.
20	2	Inactive	Subsidiary	Site compound (27m)	N/A
21	7	Active	Annex	Site compound (38m)	N/A

Table 8-19: Additional Sett Records (Historical Surveys)

Sett ID	No. of entrances	Type	Closest Infrastructure/Activities	Notes
A	3	Subsidiary	Proposed construction access track (447m)	N/A
B	2	Subsidiary or Outlier	Proposed construction access track (297m)	N/A
C	4	Annex	Proposed construction access route between northern and southern turbine clusters (existing local road) (173m)	N/A
D	2	Subsidiary	Proposed construction access route between northern and southern turbine clusters (existing local road) (240m)	N/A

8.7.6.4.2 Otter

Otter signs including prints and spraints were recorded along the Fear English River to the north of T4, and also at the bog pool near of T8. A potentially active otter holt is present along the Fear English River to the north of T4, with mixed-age spraint recorded nearby. A potential otter holt to the south of T4 was observed to be inactive, similarly to previous surveys in 2019. A lateral tree root extends across the entrance to this burrow, with continued growth of the root restricting access and severely reducing potential for use by otter. A two-entrance den/burrow with potential to be used as a maternity holt was observed along a drainage ditch upstream of the Fear English River separating conifer plantation from agricultural land to the north of T6. Trail camera surveys completed under licence 058/2024 confirmed this is not being used by otter. Similarly, a feature with potential to be used as a holt was observed along a drainage ditch/treeline north of T2, but was confirmed as not being used by otter. This is currently assessed as being a potential outlier sett (Sett 13 detailed above). All holts and potential holts detailed above are outside the Proposed Wind Farm boundary. The baseline otter report is included in Appendix 8.1-3.

An incidental record of otter using an artificial pond created by peat harvesting on Timahoe North Bog was noted during wader transect surveys in 2021. This record was located c. 2.1 km south-east of the holts recorded on the Fear English River.

8.7.6.4.3 Fox

The presence of this common mammal was indicted by observations of scat in mixed/broadleaved/conifer woodland and bog woodland. A number of dens which could potentially be used by fox were also noted.

8.7.6.4.4 Red Squirrel

Red squirrel feeding signs in the form of stripped spruce cones were recorded in wooded areas in the north of the Proposed Wind Farm, with the majority of records concentrated in conifer plantation around T6 and T7. One feeding sign was also recorded in conifer plantation north of the proposed substation. No dreys were observed during surveys.

8.7.6.4.5 Pine marten

Pine marten scat was recorded in a prominent location on an existing track running along the north-western margin of Timahoe North Bog (east of T7). Scat was also recorded in a prominent location on a log in mixed broadleaved woodland east of T4. A pine marten was filmed by a trail camera at night time moving along a log near a drainage ditch/treeline south of T5.

8.7.6.4.6 Wood mouse

This species was recorded in trail camera video footage near the Fear English River west of T6, and along a drainage ditch bank to the north of T6. Small mammal burrows which could potentially be used by this species were recorded in field boundary running parallel to the proposed grid connection.

8.7.6.4.7 Irish hare

Two live sightings of Irish hare were recorded, both occurring in agricultural grassland. One record was south of T5; the other was south-west of T1.

8.7.6.4.8 Red deer

A group of red deer were flushed in immature oak plantation woodland near the northern site access route. Deer tracks and droppings were distributed widely across the area in which the Proposed Wind Farm is located. A high proportion of these signs are readily attributable to red deer, based on the size and appearance of prints and droppings. A red deer antler, and red deer hairs snagged on fencing were further signs observed confirming the presence of this species.

8.7.6.4.9 Deer species

Not all deer signs could be definitively attributed to a particular species. This includes droppings, trails/tracks, and bark stripping. The height at which bark stripping was observed could indicate either red or fallow deer, but is unlikely to indicate Sika. It is noted that fallow deer were identified onsite during previous surveys.

8.7.6.4.10 Irish stoat

An Irish stoat print was observed in mud bordering a drainage ditch in a densely vegetated field boundary to the south-west of T5.

8.7.6.4.11 Rabbit

Rabbit burrows were observed in agricultural field boundaries and woodland margins. European rabbit is classified as a non-native invasive species.

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Legend

- Proposed Development Boundary
- Badger, Latrine
- Badger, Print
- Badger, Scat
- Badger, Snuffle
- Badger, Snuffles
- Badger, Trail, Hairs
- Badger, Trail, Snuffles
- Deer, Bark Stripping
- Deer, Browsing Signs
- Deer, Track
- Deer, Wallow
- Fox, Scat
- Irish Hare, Live Sighting
- Irish Stoat, Prints
- Pine Marten, Scat
- Pine Marten, Trail Cam Footage
- Rabbit, Burrow
- Red Deer, Antler
- Red Deer, Live Sighting
- Red Squirrel, Abundant Feeding Signs
- Red Squirrel, Feeding Sign
- Red Squirrel, Feeding Signs
- Wood Mouse, Trail Cam Footage

TITLE:	Mammal Field Signs		
PROJECT:	Drehid Wind Farm and Substation		
FIGURE NO:	8.10		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:20,000	**REVISION:**	0
DATE:	12/05/2025	**PAGE SIZE:**	A3

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8.7.7 Bats

The results of the bat desktop study and onsite bat surveys are presented below. The bat report is included in Appendix 8.1-4.

8.7.7.1 Desktop Study

The UBSS Cave Database for the Republic of Ireland, Ordnance Survey Ireland Karst Landscapes, National Monuments Service, and National Inventory of Architectural Heritage GIS layers did not indicate that there were underground caves or monuments with bat roost potential within or near the site.

There are eight 2km grid squares which encompass the site: N73G , N73H, N73L, N73M, N73N, N73P, N73T and N73U. These held previous bat records as detailed in Table 8-20 below (NBDC maps, most recent data search 04/03/2025).

Additionally, there are desktop records of soprano pipistrelle from 1 km grid square N7234 (2019) (overlapping TDR), common pipistrelles from 1 km grid squares N7333 and N7437 (overlapping TDR) (2019)

Table 8-20: Bat records in 10km Grid square N73 and 2km Grid squares N73G, N73H, N73L, N73M, N73N, N73P, N73T, N73U.

Species	N73	N73G	N73H	N73L	N73M	N73N	N73P	N73T	N73U
Brown long-eared bat	4	0	0	0	0	1	0	2	0
Common pipistrelle	61	1	14	2	5	8	0	6	0
Soprano pipistrelle	48	0	0	0	3	15	0	17	1
Pipistrellus sp. *sensu lato*	1	0	0	0	0	0	0	0	0
Leisler's bat	27	0	1	0	3	8	0	11	0
Daubenton's bat	2	0	0	0	0	0	0	1	0
Natterer's bat	3	0	0	0	1	0	0	2	0
Whiskered bat	2	0	0	0	0	0	0	2	0

During 2018 EIAR bat surveys, a single soprano pipistrelle was observed emerging from the stand of trees where trees 14-21 are located (see Figure 3-3 in Appendix 8.1-4) (exact tree not observed). These trees are outside the Proposed Wind Farm and Substation footprint.

8.7.7.2 Bat Landscapes

Bat landscapes are plotted in 5 km grid squares, of which two overlap the Proposed Wind Farm.

For the southern turbines (T1 - T3), the bat landscape association model (Lundy et al., 2011) suggests that the development is part of a landscape that is of low-moderate suitability for all bats. These southern turbines and their environs are of moderate suitability for common pipistrelle, and low-moderate suitability for brown long-eared bat, soprano pipistrelle, Leisler's bat, whiskered bat, Daubenton's bat, whiskered bat and Natterer's bat. This area (landscape encompassing T1-T3) is of low suitability for Nathusius' pipistrelle and lesser horseshoe bat.

For the northern turbines (T4 - T11), the bat landscape characterisation is moderate for all bats. The landscape in this area is of moderate-high suitability for common pipistrelle, moderate suitability for brown long-eared bat, soprano pipistrelle, Leisler's bat, Daubenton's bat and Natterer's bat, and of low-moderate suitability for whiskered bat. The landscape encompassing T4-T11 is of low suitability for lesser horseshoe bat and for Nathusius' pipistrelle.

8.7.7.3 Bat Activity Surveys 2023

Overall, five species of bat were noted during these surveys: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Leisler's bat and Daubenton's bat, as well as genus-level records of *Myotis* and *Pipistrellus*. Survey results are presented in Table 8-21 and individual records are mapped in Appendix 8.1-4.

Table 8-21: Bat Activity Survey Results 2023 (bat passes)

	30/05/2023			08/08/2023		20/09/2023		
	TR1	TR2	TR3	TR3a	TR1	TR2a	TR3	TR1
Common pipistrelle	28	25	5	0	70	1	5	24
Soprano pipistrelle	3	3	1	9	11	0	14	21
Leisler's bat	0	32	2	2	6	26	5	0
Nathusius' pipistrelle	0	1	0	0	0	0	0	0
Daubenton's bat	0	1	0	0	0	0	0	0
Pipistrellus Sp.	0	0	0	0	0	1	12	6
Myotis sp.	0	0	0	0	0	4	0	1
Total	31	62	8	11	87	32	36	52

8.7.7.4 Bat Activity Surveys 2022

Overall, five species of bat were noted during these surveys: common pipistrelle, soprano pipistrelle, Leisler's bat, brown long-eared bat and a bat in the genus *Myotis*. Survey results are presented in Table 8-22, and individual records are mapped in Appendix 8.1-4.

Table 8-22: Bat Activity Survey Results 2022 (bat passes)

Date	28/07/2022			29/08/2022		
Transect	B	C	D	D	C	A
Common pipistrelle	2	2	12	5	0	47
Soprano pipistrelle	10	1	1	4	1	12
Leisler's bat	0	4	1	3	11	2
Brown long-eared bat	0	1	0	0	0	0
Myotis Sp.	0	0	1	0	0	0
Total	12	8	15	12	12	61

8.7.7.5 2023 Static Detector Surveys

Table 8-23 below summarises the results, in relation to bat species, recorded on the static detectors deployed in 2023, based on occurrence across the entire survey season. The occurrence of each species per survey period (i.e. spring/summer/autumn) at each detector location is detailed in Appendix 8.1-4 A total of 11 static units were deployed during each survey period. Overall, eight bat species were recorded (common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Leisler's bat, brown long-eared bat, Natterer's bat, Daubenton's bat and whiskered bat). Genus-level records of *Pipistrellus* and *Myotis* were also made.

Table 8-23: Summary of 2023 static detector results

Species	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11
Pipistrellus pipistrellus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pipistrellus pygmaeus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pipistrellus nathusii	✓	✓	✓	✓	✓	✓	✓	X	X	X	✓
Pipistrellus Sp.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Myotis daubentonii	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Myotis mystacinus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Myotis nattereri	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Myotis Sp.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Species	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11
Nyctalus leisleri	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Plecotus auritus	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Common Pipistrelle

The total number of recordings for common pipistrelle at the Proposed Wind Farm was 58,082 no. recordings; 52.39% of total recordings. These were recorded over 86 no. nights which gives an average of 675.37 no. recordings per night.

Soprano Pipistrelle

The total number of recordings of soprano pipistrelle recorded at the Proposed Wind Farm was 26,959 no. recordings; 24.31% of total recordings. These were recorded over 86 no. nights. This gives an average of 313.48 no. recordings per night.

Leisler's Bat

The total number of recordings for Leisler's bat at the Proposed Wind Farm was 22,685 no. recordings; 20.46% of total recordings. These were recorded over 86 no. nights which gives an average of 263.78 no. recordings per night.

Brown Long-Eared Bat

The total number of recordings for brown long-eared bat at the Proposed Wind Farm was 486 no. recordings; 0.44% of total recordings. These were recorded over 86 no. nights which gives an average of 5.65 no. recordings per night.

Daubenton's Bat

The total number of recordings for Daubenton's bat at the Proposed Wind Farm was 484 no. recordings; 0.44% of total recordings. These were recorded over 86 no. nights which gives an average of 5.63 no. recordings per night.

Whiskered Bat

The total number of recordings for whiskered bat at the Proposed Wind Farm was 461 no. recordings; 0.42% of total recordings. These were recorded over 86 no. nights which gives an average of 5.36 no. recordings per night.

Natterer's Bat

The total number of recordings for Natterer's bat at the Proposed Wind Farm was 226 no. recordings; 0.20% of total recordings. These were recorded over 86 no. nights which gives an average of 2.63 no. recordings per night.

Nathusius' Pipistrelle

The total number of recordings for Nathusius' pipistrelle at the Proposed Wind Farm was 11 no. recordings; 0.01% of total recordings. These were recorded over 86 no. nights which gives an average of 0.13 no. recordings per night.

Genus level Bats

The total number of recordings for bats identified to Myotis level only (could not be identified to species level) at the Proposed Wind Farm was 755 no. recordings; 0.68% of total recordings. These are likely a combination of whiskered bat, Daubenton's bat and Natterer's bat.

The total number of recordings for bats identified to Pipistrelle level only (could not be identified to species level) at the Proposed Wind Farm was 726 no. recordings; 0.65% of total recordings. These are likely a combination of common, soprano and Nathusius' pipistrelle.

The graphs within Plate 8-29 to Plate 8-39 below show the number of bat passes (per species) recorded at each static detector location over the three surveillance periods.

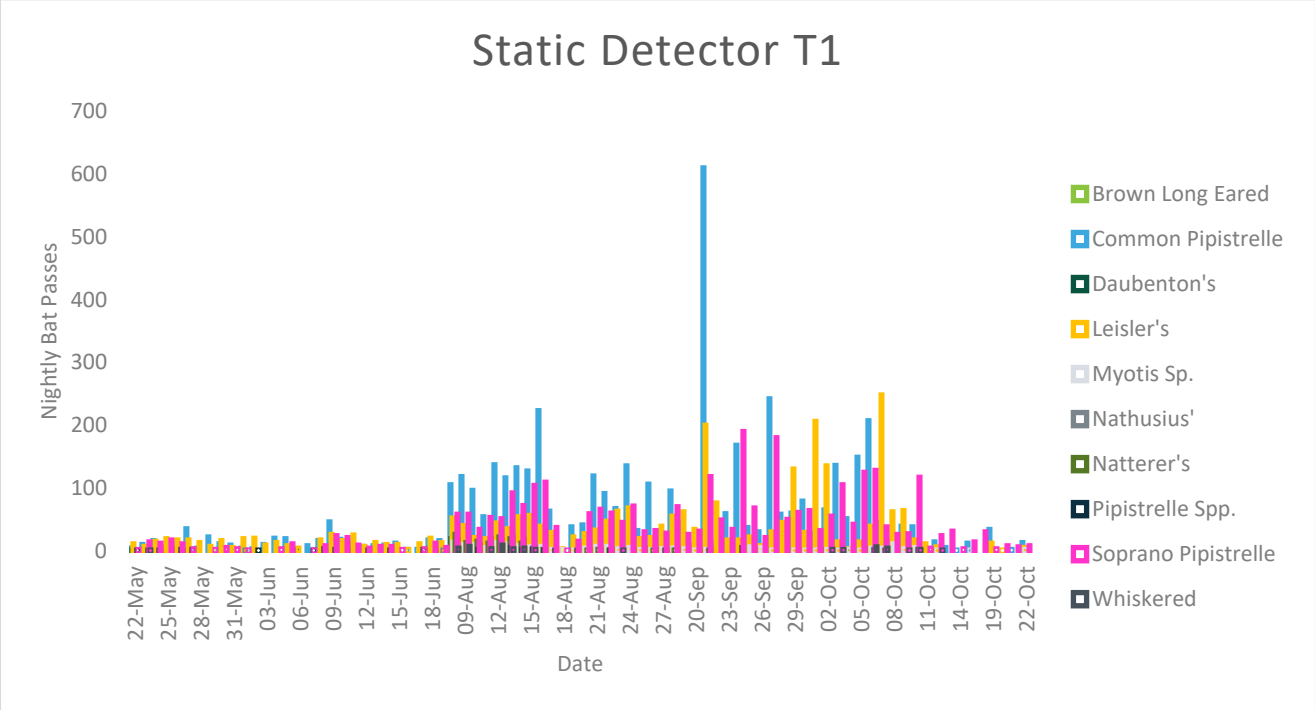

Plate 8-29: Total number of nightly passes recorded at static location T1 (2023)

The static unit T1 recorded eight species of bat, in addition to *Myotis* Spp. and *Pipistrellus* Spp. Higher levels of activity were recorded in periods 2 and 3 (08/08 - 30/08/2023 and 19/09 - 24/10/2023). Common pipistrelle spiked in activity on night 3 of round 3 (21/09/2023) with 610 passes. Leisler's bat and Soprano pipistrelle had more pronounced spikes in activity during period 3 vs periods 1 and 2.

All other species/groups had lower activity levels.

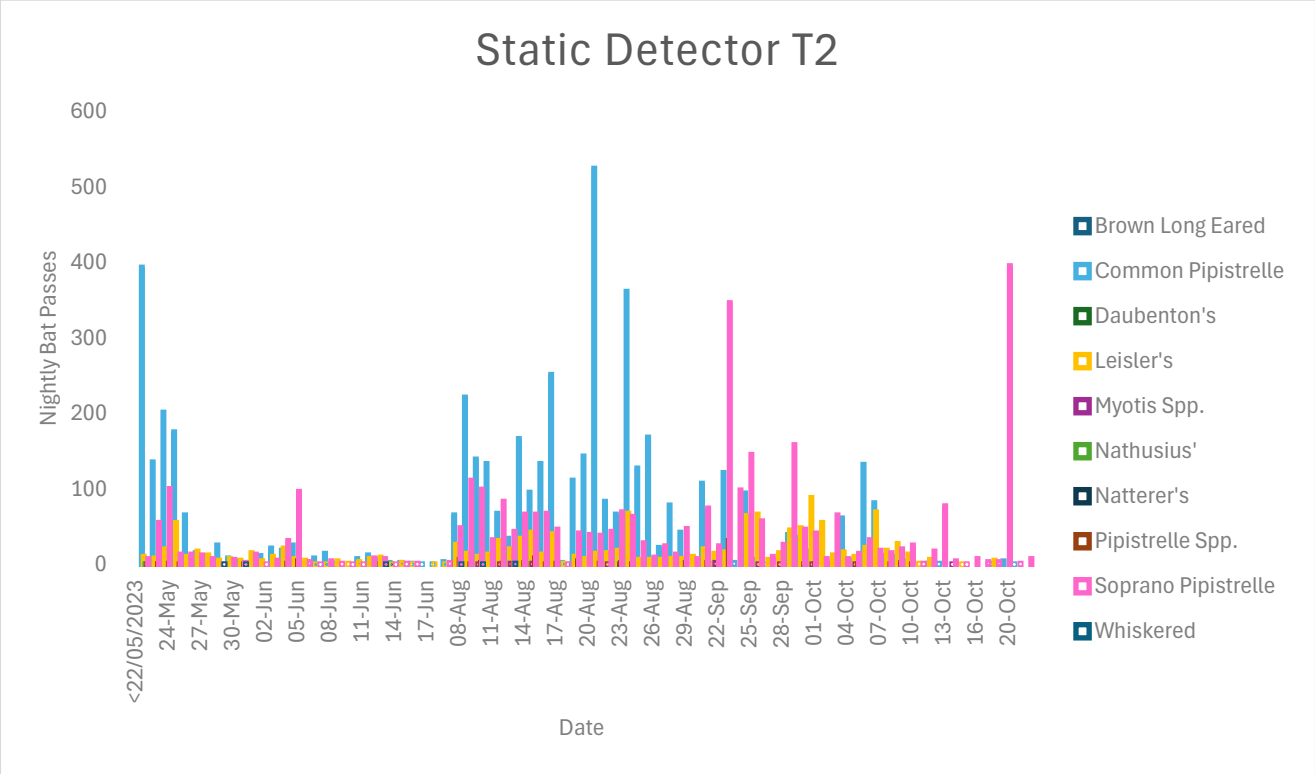

Plate 8-30: Total number of nightly passes recorded at static location T2 (2023)

The static unit T2 recorded eight species of bat, in addition to *Myotis* Spp. and *Pipistrellus* Spp. The majority of activity was recorded in periods 2 and 3 (08/08 - 30/08/2023 and 19/09 - 24/10/2023). There was a spike in activity around the beginning of period 1 (22/05/23 - 20/06/23). Common pipistrelle spiked in activity on night 14 of round 2 (21/08/2023) with 525 passes. Activity for this species was highest during period 2. Soprano pipistrelle had more pronounced spikes in activity during period 3 vs periods 1 and 2.

All other species/groups had lower activity levels.

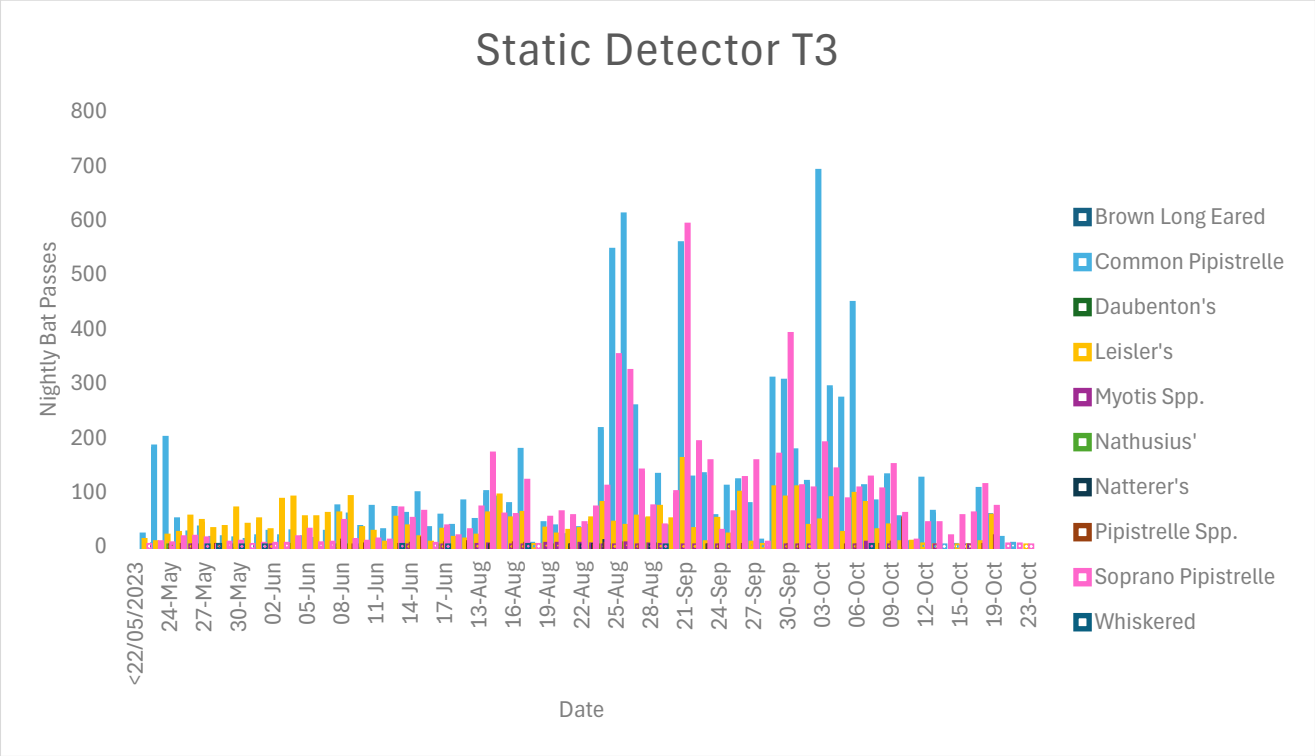

Plate 8-31: Total number of nightly passes recorded at static location T3 (2023)

The static unit T3 recorded eight species of bat, in addition to *Myotis* Spp. and *Pipistrellus* Spp. The majority of activity was recorded in periods 2 and 3 (08/08 - 30/08/2023 and 19/09 - 24/10/2023). The highest amount of activity occurred during survey period 3 (19/09 - 24/10/2023). Both common and soprano pipistrelle had higher levels of activity than other species, and common pipistrelle had the highest number of pronounced spikes in activity during all survey periods. Leisler's bat activity occurred across all survey periods, but no pronounced spikes in activity occurred for this species.

All other species/groups had lower activity levels.

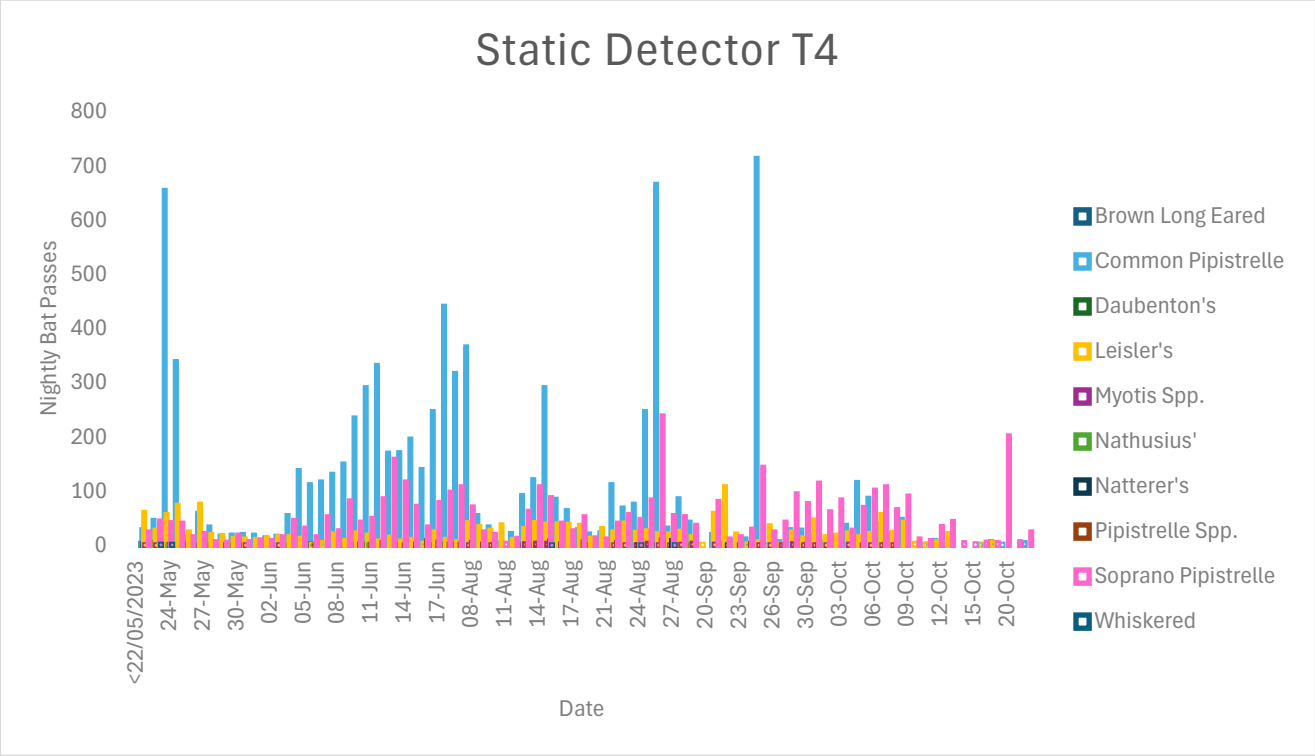

Plate 8-32: Total number of nightly passes recorded at static location T4 (2023)

The static unit T4 recorded eight species of bat, in addition to *Myotis* Spp. and *Pipistrellus* Spp. The majority of activity was recorded in period 1 (22/05/23 - 20/06/23), due to higher levels of common pipistrelle activity. The most consistent occurrence of common pipistrelle activity is within survey period 1, although larger but more isolated activity spikes for this species occur in periods 2 and 3 (the highest recorded number of passes 714 for common pipistrelle, was on 25/09/2023 during period 3). Soprano pipistrelle were active across all survey periods; this species had lower levels of activity than common pipistrelle but similar frequency of occurrence and activity spike patterns during periods 1 and 2. Soprano pipistrelle was more frequently active during period 3. Leisler's bat activity occurred across all survey periods, but spikes in activity for this species were not as pronounced as common and soprano pipistrelle.

All other species/groups had lower activity levels.

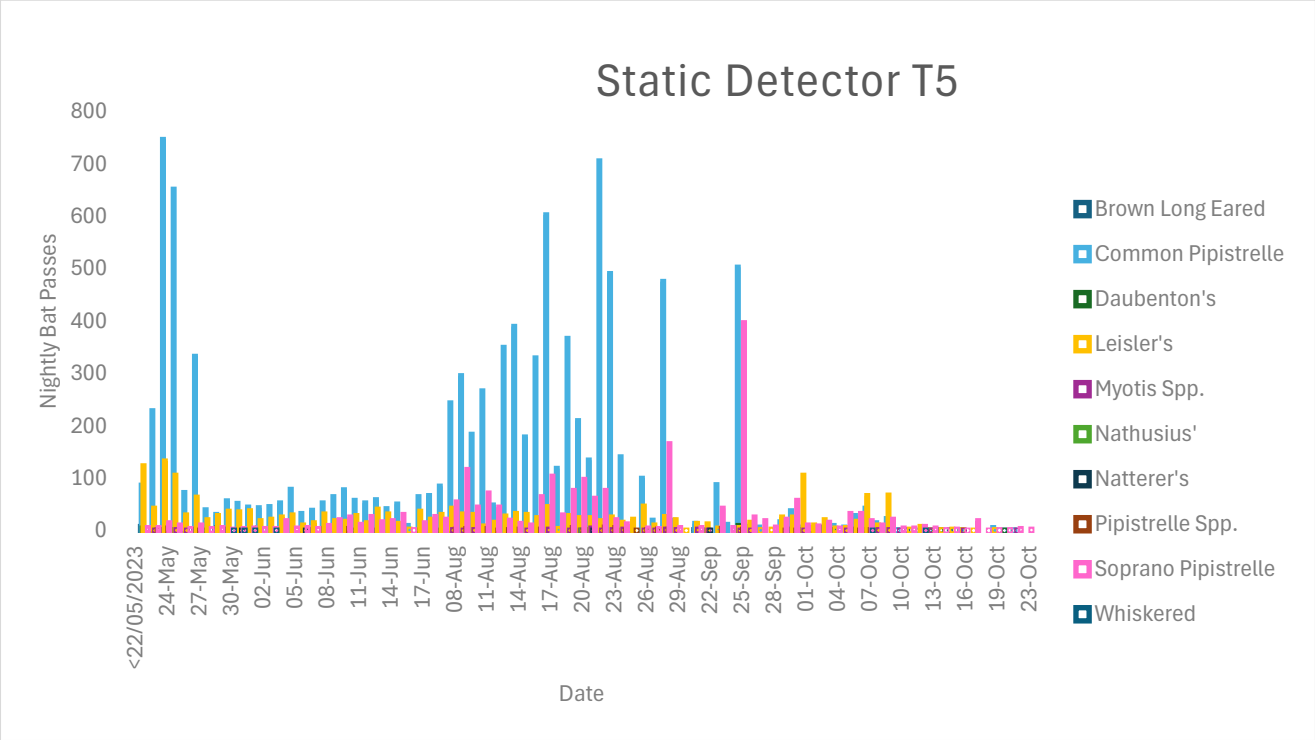

Plate 8-33: Total number of nightly passes recorded at static location T5 (2023)

The static unit T5 recorded eight species of bat, in addition to *Myotis* Spp. and *Pipistrellus* Spp. The highest activity levels at this location were recorded during survey period 2 (08/08/23 - 30/08/23), due to large spikes in common pipistrelle activity. There were also notable spikes in activity for this species at the start of period 1, but these dropped off for the remainder of period 1. Higher activity nights for soprano pipistrelle were focused in survey period 2; however the highest activity spike for this species was an outlier during survey period 3 (397 passes on 25/09/2023). Leisler's bat were more active at this location during period 1, but occurred at this location throughout surveys and had three spikes in activity late in the season (October 2023).

All other species/groups had lower activity levels.

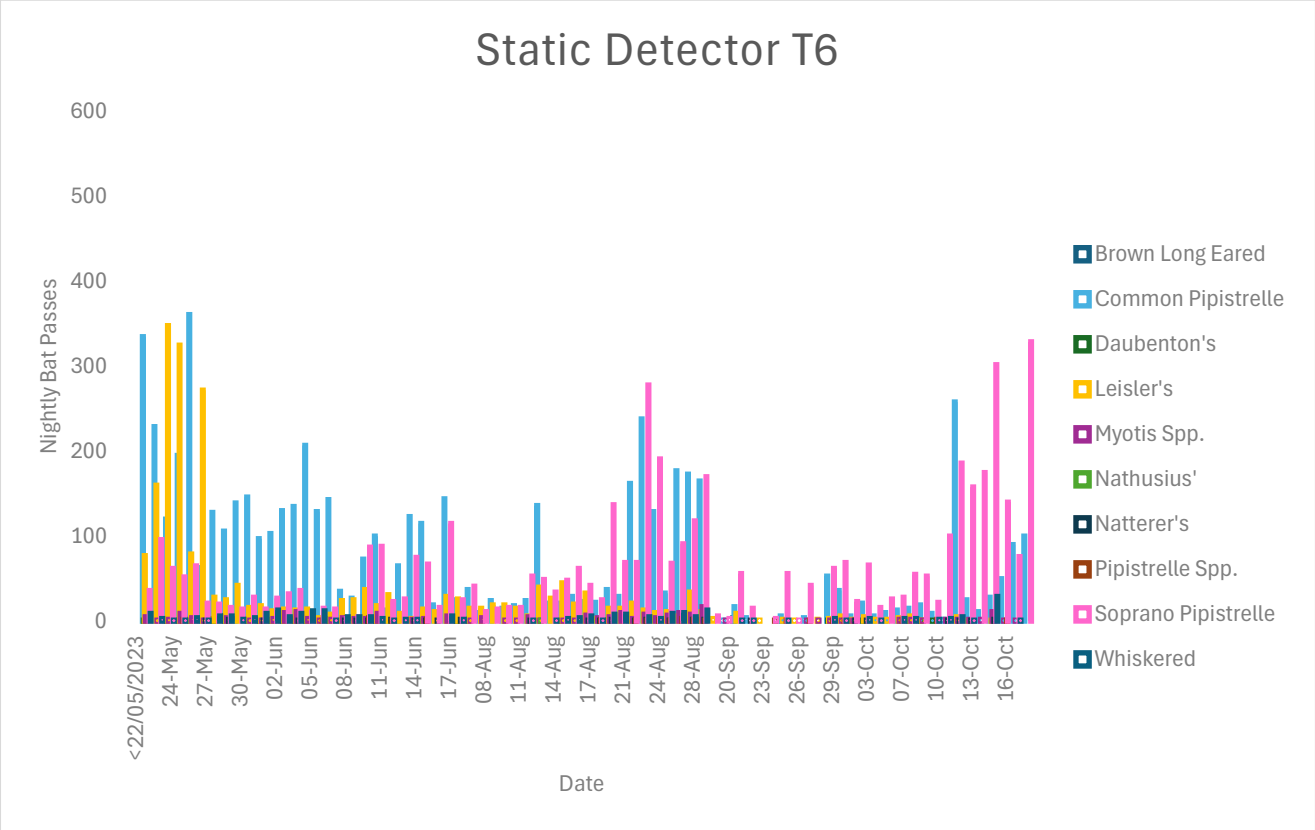

Plate 8-34: Total number of nightly passes recorded at static location T6 (2023)

The static unit T6 recorded eight species of bat, in addition to *Myotis* Spp. and *Pipistrellus* Spp. There were periods of high activity recorded across all survey periods; however, higher activity was recorded more consistently during survey period 1. The highest periods of common pipistrelle activity were during survey periods 1 and 2, while the highest periods of soprano pipistrelle were later in the season during periods 2 and 3. Leisler's bat activity during the beginning of survey period 1 was far higher than the remainder of period 1 and all of periods 2 and 3.

All other species/groups had lower activity levels.

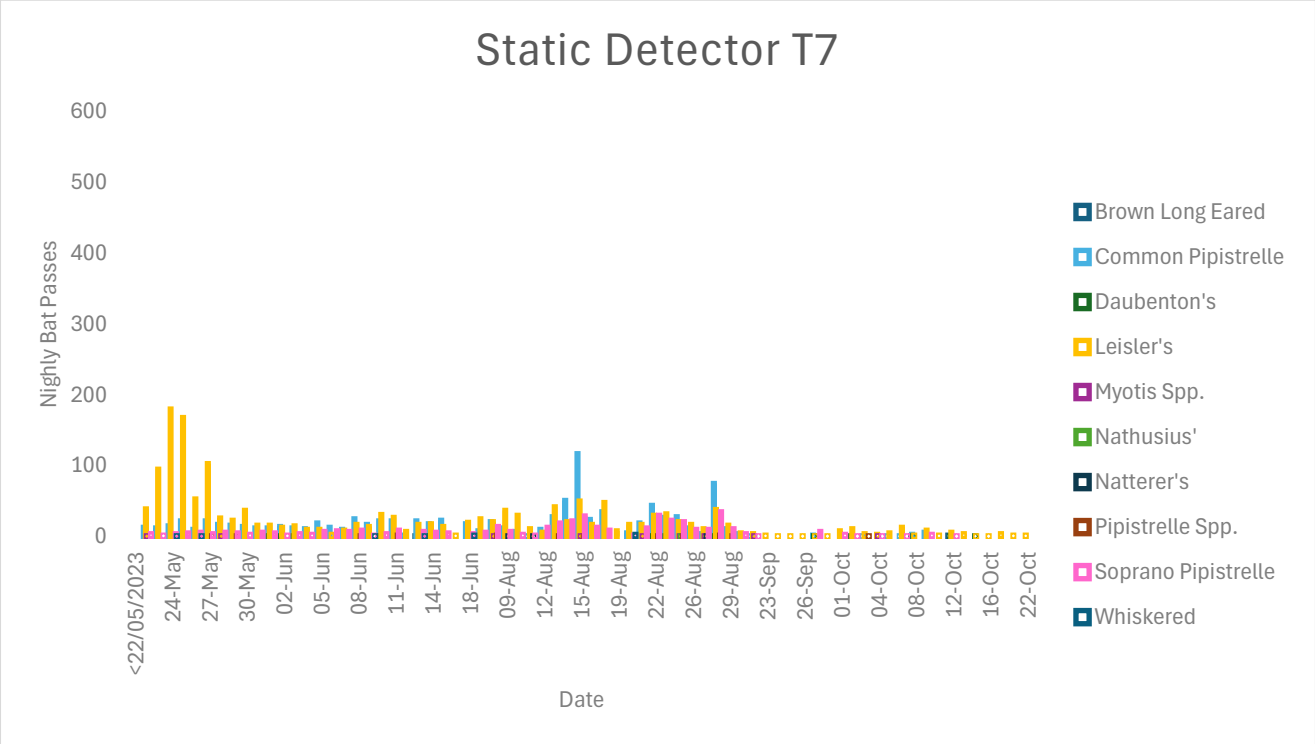

Plate 8-35: Total number of nightly passes recorded at static location T7 (2023)

The static unit T7 recorded eight species of bat, in addition to *Myotis* Spp. and *Pipistrellus* Spp. This location is notable in that it generally did not record activity spikes as high as other locations, although there were spikes in Leisler's activity around the start of period 1, with a peak of 180 Leisler's bat passes on 24/05/2023. Isolated spikes in common pipistrelle activity were recorded during survey period 2; however, these remained relatively lower (peak activity was 117 passes on 15/08/2023) than the activity spikes for this species observed at other locations.

All other species/groups had lower activity levels.

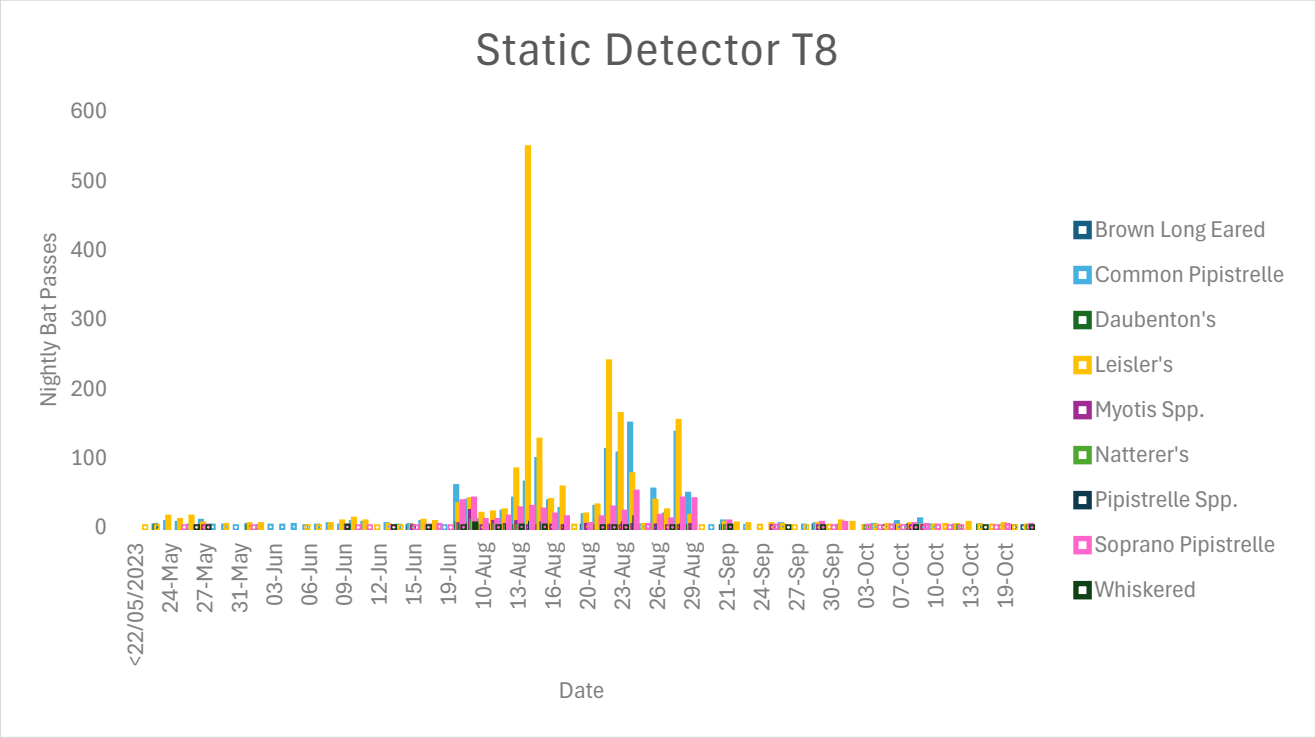

Plate 8-36: Total number of nightly passes recorded at static location T8 (2023)

The static unit T8 recorded eight species of bat, in addition to *Myotis* Spp. and *Pipistrellus* Spp. Activity at this location was focused on survey period 2, with relatively low levels recorded during the periods 1 and 3. Activity was dominated by Leisler's bat, with a number of activity spikes for this species during survey period 2 (peak activity was 548 bat passes on 14/08/2023; this was also the highest number of Leisler's bat passes recorded across all locations and survey periods). Common ad soprano pipistrelle were also more active at this location during period 2, although at relatively lower levels versus Leisler's bat.

All other species/groups had lower activity levels.

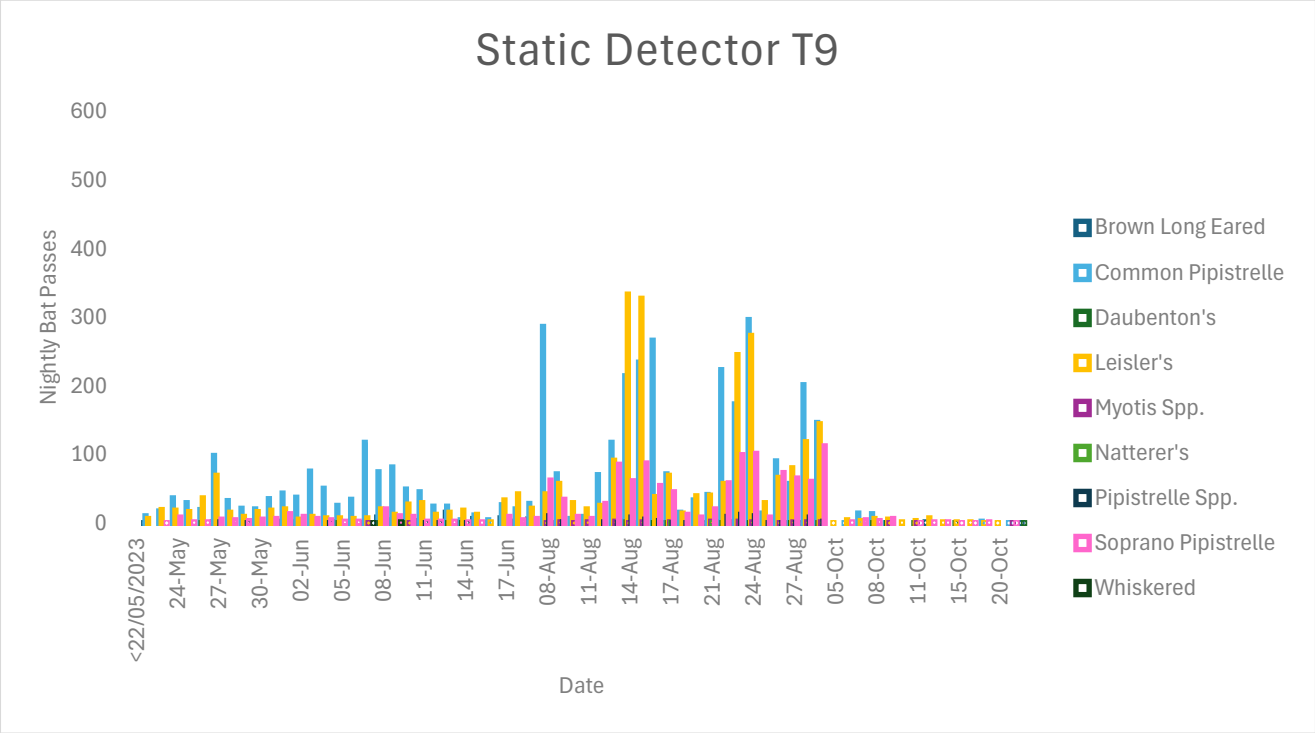

Plate 8-37: Total number of nightly passes recorded at static location T9 (2023)

The static unit T9 recorded eight species of bat, in addition to *Myotis* Spp. and *Pipistrellus* Spp. Activity at this location was highest during survey period 2, followed by period 1. Survey period 3 had relatively lower activity levels. Most of the bat activity was comprised of Leisler's bat and common pipistrelle passes, while soprano pipistrelle also comprised a relatively higher proportion of overall activity versus all other species.

All other species/groups had lower activity levels.

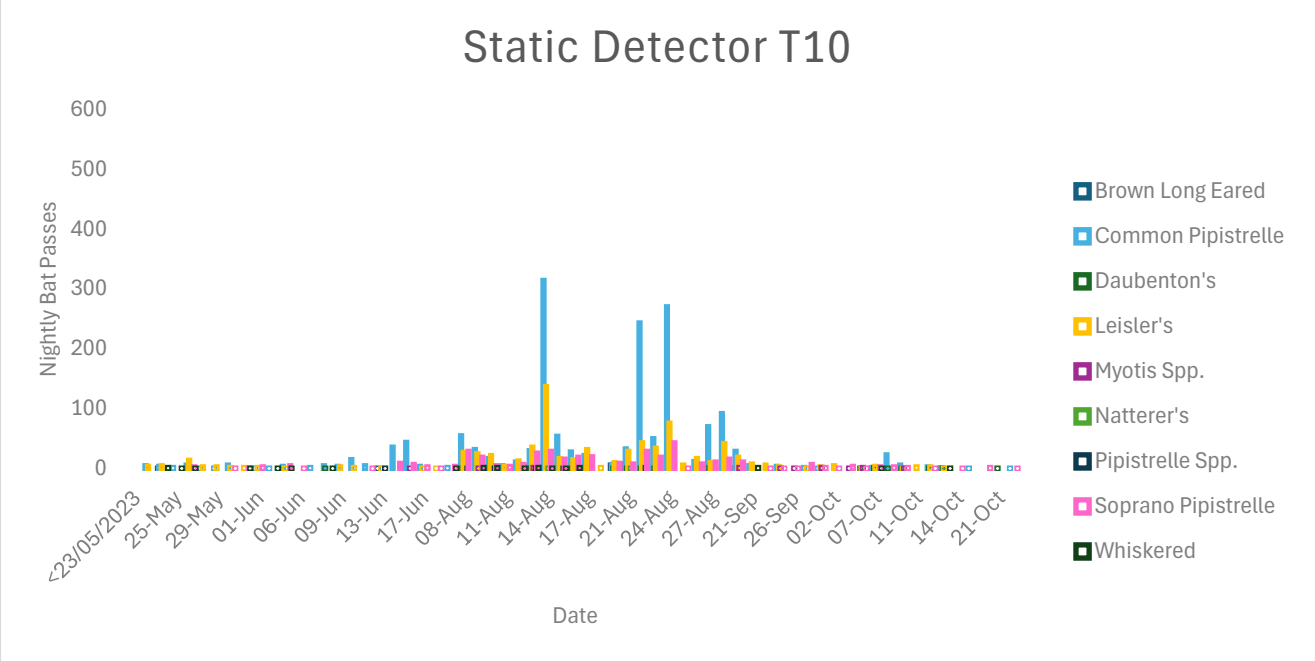

Plate 8-38: Total number of nightly passes recorded at static location T10 (2023)

The static unit T10 recorded eight species of bat, in addition to *Myotis* Spp. and *Pipistrellus* Spp. Activity across all species at this location followed a similar pattern to T8, with most activity focused in period 2; however, at T10 common pipistrelle rather than Leisler's bat accounted for the bulk of activity. Leisler's bat and soprano pipistrelle were also active at relatively higher levels during period 2 vs. periods 1 and 3.

All other species/groups had lower activity levels.

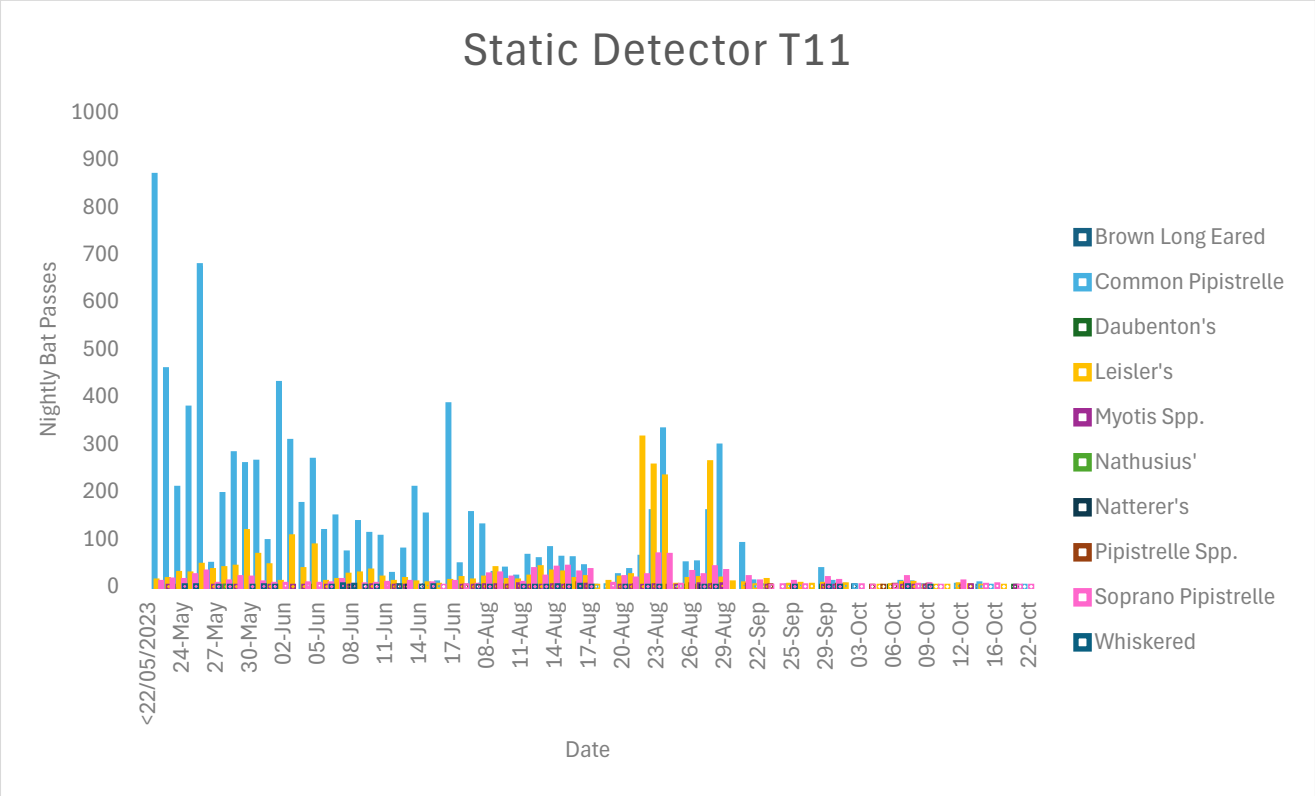

Plate 8-39: Total number of nightly passes recorded at static location T11 (2023)

The static unit T11 recorded eight species of bat, in addition to *Myotis* Spp. and *Pipistrellus* Spp. The highest activity at this location was recorded during survey period 1, and this was largely due to high common pipistrelle activity with regular spikes. The highest number of common pipistrelle passes (866) across all locations and periods was recorded here on 22/05/2023 (survey period 1). There were also common pipistrelle activity spikes during period 2. Leisler's bat activity spikes also occurred in period 1 and period 2, with higher spikes in period 2 (highest number of passes for Leisler's bat at this location was 313 on 22/08/2023). The next most active species at this location was soprano pipistrelle, although activity for this species was relatively lower than Leiser's bat and common pipistrelle.

All other species/groups had lower activity levels.

Activity at Turbine Locations

The number of passes for individual species (common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Leisler's bat, brown long-eared bat, Daubenton's bat, Natterer's bat and whiskered bat) at each static detector location for the full survey period of 2023 is detailed in Appendix 8.1-4. During the 2023 survey season, location T5 had the highest number of passes for common pipistrelle (9,850 passes). T3 had the highest number of passes for soprano pipistrelle (5,861) . T1 had the highest number of passes of Nathusius' pipistrelle (3 passes). T3 had the highest number of passes for Leisler's bat (3,171). Location T1 had the highest numbers of Daubenton's (188 passes) and Natterers' bat (129) passes. T6 had the highest number of whiskered bat passes (264). T9 had the highest number of brown long-eared bat passes (91).

8.7.7.6 2022 Static Detector Surveys

During 2022 surveys, a total of 11 static units were deployed during each survey period (DR01-02, DR04-012). Across all survey periods, eight bat species were recorded (common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Leisler's bat, brown long-eared bat, Natterer's bat, Daubenton's bat and whiskered bat) were recorded at each detector location. The occurrence of each species per survey period (i.e. spring/summer/autumn) at each detector location is detailed in Appendix 8.1-4. All summer 2022 records were identified to species level.

Common Pipistrelle

The total number of recordings for common pipistrelle at the Proposed Wind Farm was 51,398 no. recordings; 50.15% of total recordings. These were recorded over 92 no. nights, which gives an average of 558.67 no. recordings per night.

Soprano Pipistrelle

The total number of recordings of soprano pipistrelle recorded at the Proposed Wind Farm was 31,178 no. recordings; 30.42% of total recordings. These were recorded over 92 no. nights, which gives an average of 338.89 no. recordings per night.

Nathusius' Pipistrelle

The total number of recordings for Nathusius Pipistrelle at the Proposed Wind Farm was 232 no. recordings; 0.23% of total recordings. These were recorded over 92 nights, which gives an average of 2.52 no. recordings per night.

Leisler's Bat

The total number of recordings for Leisler's bat at the Proposed Wind Farm was 16,775 no. recordings; 16.37% of total recordings. These were recorded over 92 no. nights, which gives an average of 182.34 no. recordings per night.

Brown Long-Eared Bat

The total number of recordings for Brown Long-Eared Bat at the Proposed Wind Farm was 983 no. recordings; 0.96% of total recordings. These were recorded over 92 no. nights, which gives an average of 10.68 no. recordings per night.

Daubenton's Bat

The total number of recordings for Daubenton's Bat at the Proposed Wind Farm was 1,559 no. recordings; 1.52% of total recordings. These were recorded over 92no. nights, which gives an average of 16.95 no. recordings per night.

Whiskered Bat

The total number of recordings for Whiskered Bat at the Proposed Wind Farm was 211 no. recordings; 0.20% of total recordings. These were recorded over 92 no. nights, which gives an average of 2.28 no. recordings per night.

Natterer's Bat

The total number of recordings for Natterers Bat at the Proposed Wind Farm was 157 no. recordings; 0.15% of total recordings. These were recorded over 92 nights, which gives an average of 1.71 no. recordings per night.

Activity at Turbine Locations

The number of passes for individual species (common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Leisler's bat, brown long-eared bat, Daubenton's bat, Natterer's bat and whiskered bat) at each static detector location for the full survey period of 2022 is detailed in Appendix 8.1-4 .

During the 2022 survey season, location Dr08 had the highest number of passes for common pipistrelle (11,554). Dr08 also had the highest number of passes for soprano pipistrelle (7,860), closely followed by Dr04 (7,626). Dr02 had the highest number of passes of Nathusius' pipistrelle (60); as noted in Section 8.5.3.9 the number of passes for this species is likely to be an overestimate due to the use of Kaleidoscope auto-ID. Dr04 had the highest number of for Leisler's bat passes (2,584); Dr05, Dr07 and Dr08 also had similar numbers of Leisler's bat passes (all above 2000). Dr08 and Dr11 had the highest numbers of brown long-eared bat passes (148 and 141 respectively). Dr12 had the highest number of Daubenton's bat passes (1,062). All other locations had <129 passes for this species. Dr06 and Dr08 both had the highest numbers of Natterers' bat passes (27 at both). Dr08 had the highest number of whiskered bat passes (98).

8.7.7.7 Roost Surveys

Roost surveys were completed across two years (2022-2024).

8.7.7.7.1 Preliminary Roost Assessment 2022

A total of five bat boxes in the northern section of the site were identified in the desk study (BCI data) and these were inspected by Tom O'Donnell under his bat survey license. Four of the five bat boxes were surveyed in 2022, the fifth having fallen to the ground at that time. One adult male Soprano Pipistrelle was found in bat box No. 5. No bats were present in remaining boxes but all showed signs of previous use by bats.

A total of seven historically mapped building locations (mapped in 1st edition ordnance survey maps completed in 1846 but absent in the 2nd edition completed in 1915) near the Proposed Wind Farm were investigated; these were confirmed as absent, as indicated in 2nd edition OS mapping. A stonework crypt at Dunfierth Chapel located 1.4 km north-east of the T11 was investigated. Internal access was not possible; abundant stonework crevices were present along the walls. A possible void between the brick ceiling and slate roof was observed. A possible underground portion was noted. No evidence of occupation by bats was noted.

8.7.7.7.2 Re-checks of Potential Roost Features identified in 2018

These features first recorded in 2018 were re-checked in 2024. The majority of tree PRFs recorded in 2018 are still present in the same condition. The exceptions are a new knothole identified on tree No.3, and tree No.11 which has fallen, lowering the PRF to an un-useable height for bats. The results of this survey are detailed in Table 3-10 of Appendix 8.1-4, and locations are shown in Figure 3-1 of Appendix 8.1-4.

A number of bat boxes which were present in 2018 are no longer attached to trees: bat boxes 2, 3, 7, 8 and 9. No signs of box 7 were found. Remnants of the other boxes were present at the bases of trees.

Harvesting of conifers has recently occurred in a number of areas adjacent to trees with bat boxes, removing connectivity and shelter and thereby reducing suitability for bats. This has occurred at boxes 6 and 10. Bird droppings were also noted on the landing strips of these boxes, indicating more recent use by birds rather than bats.

Inspections of the bat boxes in 2022 noted evidence of use by bats, and an adult male soprano pipistrelle was observed roosting in box 5. It is noted that the inspection panels are now missing from boxes 4 and 5, reducing their suitability for roosting bats. Taking into account the bat boxes which have fallen down, those which have sub-optimal landscape conditions due to tree felling and those with missing inspection panels, bat box 1 is the only box of the original ten boxes which remains in good condition with suitable surrounding landscape features. As such, this box has potential to be used by roosting bats. Boxes 4 and 5 have negligible suitability due to missing inspection panels, and boxes 6 and 10 have low potential due to declines in shelter and/or connectivity conditions but cannot be ruled out as potentially being of occasional use on a precautionary basis. It is noted that future planting in these areas may improve connectivity over the lifetime of the wind farm; however, based on observed longevity of other bat boxes currently installed, none of the current bat boxes are likely to persist long term.

8.7.7.7.3 Potential Roosting Features identified in 2024 (Proposed wind farm & Substation)

A total of 17 trees (additional to the trees identified during 2018 surveys) with potential for bat roosting were identified during surveys of the Proposed Wind Farm and Substation in March-April 2024. Within these, a total of nine low potential trees are within turbine felling buffers, and one low-moderate and one moderate potential trees are also within turbine felling buffers. The moderate potential tree is a mature ash with rot within the T5 felling buffer, featuring a knothole c.3 m up the trunk, potentially with room for several bats. No signs of use by bats were observed from ground level. These are detailed in Table 3-8 in Appendix 8.4-4 and shown on Figure 3-2 in Appendix 8.4-4.

8.7.7.7.4 Potential Roosting Features (TDR)

A total of 12 trees with potential for occasional use by individual or low numbers of bats (negligible to low potential) were identified along the TDR in areas where tree trimming is likely to be required to permit the passage of turbine components. Details of these features and location coordinates are included in Table 3-10 in Appendix 8.4-4.

8.7.7.7.5 Derelict Building (northern turbine delivery site access route)

A small derelict brick-built shed is present within the footprint of the northern internal access track. Part of the corrugated roof is missing. A chimney is present. There are no PRFs in the roof, and no gaps are present in the brickwork of the shed including the chimney. The shed is surrounded by plantation woodland.

No PRFs or signs of use by bats were observed.

A disused swallow's nest was present in a corner covered by remnants of the roof.

8.7.8 Other Species

8.7.8.1 Desktop Study

The following protected/threatened species from other groups are present within NBDC records for 10 km grid square N73.

The closest record of smooth newt is from Dunfierth, c. 1.1 km north-east of the proposed grid connection high voltage loop-in.

Table 8-24: Other species - desktop records

Species name	Date of last record	Title of dataset	Designation	Closest Desktop Record
Common Frog (*Rana temporaria*)	18/03/2023	Amphibians and reptiles of Ireland	EU Habitats Directive Annex V; Wildlife Acts	0m (100m records overlap proposed access track northwest of T9)
Smooth Newt (*Lissotriton vulgaris*)	04/06/2020	Amphibians and reptiles of Ireland	Wildlife Acts	1.1 km
Dark Green Fritillary (*Argynnis aglaja*)	31/07/2018	Butterflies of Ireland pre-2022	Vulnerable	600m
Dingy Skipper (*Erynnis tages*)	13/06/2021	Butterflies of Ireland pre-2022	Near threatened	1.2 km
Large Heath (*Coenonympha tullia*)	12/08/2021	Butterflies of Ireland pre-2022	Vulnerable	780m
Marsh Fritillary (*Euphydryas aurinia*)	20/09/2022	Butterflies of Ireland post 2021	EU Habitats Directive Annex II; Vulnerable	99m
Small Heath (*Coenonympha pamphilus*)	06/06/2022	Butterflies of Ireland post 2021	Near threatened	372m
Barbut's Cuckoo Bee (*Bombus Psithyrus barbutellus*)	13/07/2014	Bees of Ireland	Endangered	1.1 km

Species name	Date of last record	Title of dataset	Designation	Closest Desktop Record
Gipsy Cuckoo Bee (*Bombus Psithyrus bohemicus*)	05/04/2020	Bees of Ireland	Near threatened	288m
Gooden's Nomad Bee (*Nomada goodeniana*)	19/04/2022	Bees of Ireland	Endangered	2.8 km
Large Red Tailed Bumble Bee (*Bombus Melanobombus lapidarius*)	05/03/2024	Bees of Ireland	Near threatened	1.2 km
Patchwork leafcutter bee *Megachile (Megachile) centuncularis*	18/07/2022	Bees of Ireland	Near threatened	4.2 km
Moss Carder-bee (*Bombus Thoracombus muscorum*)	04/05/2020	Bees of Ireland	Near threatened	1.2 km
Common Lizard (*Zootoca vivipara*)	30/06/2018	Amphibians and reptiles of Ireland	Wildlife Acts	2.9 km

8.7.8.2 Previous Surveys (Other Species)

Common lizard and common frog were recorded during the 2018 EIAR surveys.

8.7.8.2.1 2018 EIAR Surveys: Lepidoptera and Odonata

During 2018 EIAR surveys, the following butterfly species: small copper (*Lycaena phlaeas*), meadow brown (*Maniola jurtina*), green-veined white (*Pieris napi*) and large heath (*Coenonympha tullia*) were recorded. As per Table 8-24 above, large heath is categorised as Vulnerable.

Pre- 2018 EIAR surveys also recorded the following butterfly and dragonfly/damselfly species (all are categorised as Least Concern):

Lepidoptera

- Small tortoiseshell (*Aglais urticae*)
- Peacock (*Inachis io*)
- Speckled wood (*Pararge aegeria*)
- Meadow brown (*Maniola jurtina*)
- Ringlet (*Aphantopus hyperantus*)

Odonata

- Brown hawker (*Aeshna grandis*)
- Ruddy darter (*Sympetrum sanguineum*)
- Four-spotted chaser (*Libellula quadrimaculata*)
- Banded demoiselle (*Calopteryx splendens*)
- Large red damselfly (*Pyrrhosoma nymphula*)

8.7.8.2.2 2019 FI Surveys: Lepidoptera and Odonata

A lepidoptera survey was undertaken to inform the FI response in 2019 (survey carried out on Mulgeeth raised bog during July 31st to August 1st 2019).

During this survey, no marsh fritillary or associated larval foodplants were found in this area. A range of lepidoptera (moths and butterflies) and odonata (damselflies and dragonflies) were noted during this survey.

A notable moth species which was caught in the light trap was the Micromoth *Nemapogon koenigi*. This is the second Irish record; the first was found in Co. Antrim in August 2015. The larva is reported to feed on fungus, especially bracket fungus, as well as on decaying wood, especially on birch. No red list assessment for Irish micromoths has been published to date.

Other species recorded during this survey were:

Lepidoptera (Butterflies) (all categorised as Least Concern)

- Peacock (*Inachis io*)
- Green veined white (*Pieris napi*)
- Common blue (*Polyommatus Icarus*)
- Ringlet (*Aphantopus hyperantus*)

Lepidoptera (Moths) (all macro-moth species categorised as least concern. Red list assessments have not been completed for other groups to date).

- *Agriphila straminella*
- Bilberry Tortrix (*Aphelia viburnana*)
- *Blastobasis adustella*
- Buff Footman (*Eilema depressa*)
- *Catoptria margaritella*
- Cinnabar (*Tyria jacobaeae*)
- Common Footman (*Eilema lurideola*)
- Common Heath (*Ematurga atomaria*)
- Common Rustic (*Mesapamea secalis*)
- Common White (*Cabera exanthemata*)

- *Crambus pascuella*
- Crescent (*Helotropha leucostigma*)
- Dark Arches (*Apamea monoglyph*)
- *Dipleurina lacustrata*
- Dotted Clay (*Xestia baja*)
- Emperor (*Saturnia pavonia*)
- *Eudonia mercurella*
- *Eupoecilia angustana*
- Garden Grass Veneer (*Chrysoteuchia culmella*)
- High Highflyer (*Hydriomena furcata*)
- Large Yellow Underwing (*Noctua pronuba*)
- Lesser Common Rustic (*Mesapamea didyma*)
- Mottled Beauty (*Alcis repandata*)
- *Olethreutes schulziana*
- Pinion-streaked Snout (*Schrankia costaestrigalis*)
- Smoky Wainscot (*Mythimna impura*)
- *Stigmella lapponica*
- True-lover's Knot (*Lycophotia porphyria*)
- *Udea lutealis*
- *Udea prunalis*
- Willow Beauty (*Peribatodes rhomboidaria*)

Odonata (all categorised as Least Concern)

- Brown hawker (*Aeshna grandis*)
- Common Hawker (*Aeshna juncea*)
- Emperor dragonfly (*Anax imperator*)
- Black Darter (*Sympetrum danae*)
- Common Darter (*Sympetrum striolatum*)

8.7.8.3 Current Surveys (Other Species)

8.7.8.3.1 Marsh fritillary

Marsh fritillary surveys in 2022 recorded a total of 29 marsh fritillary larval webs in pockets of *Molinia*-dominated grassland with devil's bit scabious along the north-western edge of Timahoe North Bog. All larval web records are outside the Proposed Wind Farm, which is restricted to the wooded areas to the north-west of the marsh fritillary habitat bordering the open bog.

Repeat surveys in September 2023 did not detect any larval webs, but did confirm the extent and distribution of devil's bit scabious and associated marsh fritillary habitat remains similar to 2022. Smaller isolated patches of devil's bit scabious were also recorded in association with existing forestry tracks in the woodland habitats north-west of the open bog, including an area of devil's bit scabious immediately adjacent to the proposed T7 - T8 access track. These areas of devil's bit scabious along forestry tracks are unsuitable for marsh fritillary, due to limited extent, lower density of devil's bit scabious and their location in woodland. No larval webs were found at this location during surveys.

Marsh fritillary is an Annex II species under the Habitats Directive, and as such requires the designation of special areas of conservation. The Irish population is assessed as Vulnerable under the current Red List.

8.7.8.3.2 Common Lizard

Surveys in 2021 and 2022 confirmed the presence of common lizard, with records concentrated in the northern part of the Proposed Wind Farm, particularly in recently felled/replanted conifer plantation south of the proposed substation. The observed distribution pattern of lizards across the study area is assessed to align with the distribution of suitable habitat for this species. One lizard was also observed in the vicinity of T11. See Appendix 8.1-6 for the baseline lizard survey reports 2021-22.

This species was confirmed present during 2023 transect surveys, when a basking lizard was flushed in raised bog 220m east of T8 during lizard transect surveys.

Common lizard is protected under the Wildlife Act.

8.7.8.3.3 Common Frog

Observations of adult common frogs around the bog pool east of T8 (within Proposed wind Farm boundary) and in recolonising cutover bog south-west of T4 (outside Proposed wind Farm boundary) reconfirmed the presence of this species in the area.

Common frog is protected under the Wildlife Act and is listed on Annex V of the Habitats Directive.

8.7.8.3.4 Common Carder Bee

A common carder bee *Bombus pascuorum* was observed feeding on devil's bit scabious on the margin of Timahoe North Bog (outside Proposed Wind Farm). This species is assessed as Least Concern.

8.7.8.3.5 Raft Spider

A raft spider was observed at a bog pool in drained raised bog on Timahoe North Bog (outside Proposed Wind Farm), northwest of T8. No Irish red list assessment of arachnids has been completed to date.

8.7.9 Aquatic Ecology

8.7.9.1 Study Area - Boyne Catchment

The Proposed Wind Farm is located within the Boyne catchment. The River Boyne main channel rises near Edenderry on the borders of Counties Offaly and Kildare and flows in a north-easterly direction for 112 km before entering the Irish Sea at Drogheda. Together with its tributaries, it drains a catchment of approximately 2,500 km^2. The River Boyne corridor, together with its tributary the Kells Blackwater River, is designated as a Special Area of Conservation (SAC) (Site Code: 002299). In addition, the River Boyne main channel is also a designated salmonid river under the EU Freshwater Fish Directive (78/659/EEC).

An arterial drainage programme was undertaken throughout the Boyne catchment between 1969 and 1985 (O'Grady 1998). The only major section of this catchment which was not drained was the lower reaches of the main Boyne channel - from Navan downstream, and a section of the Kells Blackwater. The river channels affected by the Proposed Wind Farm were all dredged and channelised at this time and are subjected on ongoing drainage maintenance.

8.7.9.2 Previous Surveys - General Description of Ballynamullagh/Fear English upper

The following assessment was provided by Ecofact based on surveys carried out in 2019 to inform a further information response. The current baseline conditions remain similar to this description of the Ballynamullagh, which is intersected by three proposed access track crossings. Please note the text below has been updated to reflect the currently proposed number of wind turbines and access track crossing points.

"*The Ballynamullagh Stream (EPA Code: 07B19) is also a tributary of the Blackwater [Longwood] River and along with part of the Coolree 07 (stream 07C23) is known locally as the Fear English Stream. This is a local stream name. However, as this name has been used in other parts of the assessment and this name has been specifically mentioned in the Further Information Request then this section deals specifically with the receptor.*

The EPA notes this stream as the Ballynamullagh Stream, which flows into the Coolree 07 Stream downstream, and just below Johnstown. It is understood that both the stretch of the Ballynamullagh Stream and the Coolree 07 Stream are recognised locally as the 'Fear English' Stream. Approximately seven of the 11 proposed turbines are located adjacent to the Ballynamullagh Stream (Fear English upper) and it is proposed that three access roads will cross this stream at different points. This watercourse was surveyed in detail in September 2018 and additional surveys and evaluations of this watercourse were also undertaken during the September 2019 survey.

This stream is well known to Ecofact and we first surveyed it in 2005 as part of a catchment-wide electrical fishing survey of the River Boyne completed on behalf of NPWS (O'Connor, 2006). The site surveyed in 2015 was in the same location as Site 6 (Coolree 07 River, 07_1848) in the current survey. In O'Connor (2006) it is stated that "no lampreys were recorded on the Fear English stream, which was visibly polluted at the time of the survey". Only Minnow and Three-spined Stickleback were recorded at this site during the 2005 survey. Conditions in this stream have declined since the 2005 survey due to agricultural pollution and arterial drainage maintenance. Site 6 is located downstream of the confluence of the Ballynamullagh Stream (EPA Code: 07B19) and Clonkeeran Stream (EPA Code: 07C26). The watercourse at this site is therefore larger than the section which runs through the proposed wind farm site and therefore more likely to be of aquatic ecological importance. However, Site 6 is a degraded and polluted stream that does not contain a significant aquatic ecological community. This stretch of river has been recently maintained and is affected by pollution from agricultural activities. Cattle had free access to Site 6 during the 2019 surveys.

The overall Fear English stream catchment is not monitored by the EPA during its roll-over national biological water quality monitoring surveys. The sub-catchment is probably not surveyed due to its small size. The sub-catchment is assessed as an "at risk" waterbody by the EPA and has a Water Framework Directive (2010-2015) waterbody status of "Moderate". We surveyed it however and gave it a biological water quality rating of Q3, corresponding to 'Poor' status. There were no White-clawed Crayfish or Lampreys at Site 6 during the 2019 survey. Minnow and Three-spined Sticklebacks were the main species present. One Brown Trout was recorded – which was surprising considering how impacted the site was. We considered that this site was the upper limit of the distribution of Brown Trout in this small degraded stream. It is noted that as the stream gets smaller upstream of here and into the proposed wind farm site upstream of the Clonkeeran Stream confluence then the stream becomes even less significant in aquatic ecological terms. Sites 9 and 10 were located in the upper reaches of the Fear English stream upstream of the proposed wind farm site and these areas did not contain any salmonids. These are not spawning and nursery streams for salmonids, and other important species such as crayfish and lampreys are absent. These streams and the Fear English stream in general is just too small, degraded and polluted to hold significant fish populations. This stream in general only contains Three-spined Sticklebacks and Minnows and a few trout in the lower reaches as it drains towards the Blackwater (Longwood) River. And as evidenced by the results in the current survey even the main channel of the Blackwater (Longwood) River is also affected by pollution and is a heavily modified watercourse."

As it runs through the proposed wind farm site the Fear English is a very low gradient channelized stream with a silt bed and high banks. It is heavily silted and polluted – from agricultural, forestry and peat bog development impacts. It is also a very uniform channel, and just becomes increasingly smaller and less important for aquatic ecology. The entire stretch affected by the proposed wind farm – and all the proposed bridge crossing sites – have all been fully assessed and evaluated. The entire affected stretch is assessed as being Local Importance (Lower Value)! only and does not contain any significant aquatic ecological communities. Its main consequence is its potential role in conveying construction phase pollutants downstream. However extensive mitigation measures have been provided to avoid this potential impact. The access track from T1 to T2 crosses the 2nd order Ballynamullagh Stream (EPA Segment Code: 07_983), just downstream of the 1st order Drehid Stream (EPA Segment Code: 07_800) confluence. This access track crossing is located over an existing hedgerow, surrounded by improved agricultural grassland fields. Turbine 1 is located c. 250m from the Ballynamullagh Stream at its closest point, and Turbine 2 is located c. 204m from this stream. The access track runs within 20m of a hedgerow for c. 470m. Survey sites 9 and 10 are located upstream from here. This is a drained and channelized watercourse with no salmonid habitats present. It is sluggish and overgrown and not of aquatic ecological importance. The access track from T2 to T3 also crosses over the 2nd order Ballynamullagh Stream (EPA Segment Code: 07_983). This access track crosses over an existing road over this watercourse, likely used as an agricultural track. There are mature hedgerows / treelines adjacent to this crossing. To the north, west and south the landscape consists of improved agricultural grassland fields. To the east, another field is present with rushes / wet grassland. Turbine 3 is located c. 125m from the Ballynamullagh Stream at its closest point. This again is a drained and channelized watercourse with no salmonid habitats present. It is sluggish and overgrown and not of aquatic ecological importance. The substrate is mud and there is no salmonid spawning or nursery habitat present.

Turbine 4 is located c. 90m from the Ballynamullagh Stream at its closest point. There is no salmonid spawning or nursery habitat present at this site. As with the rest of this stretch this is an overgrown, low-gradient degraded stream. Woodland is present north and north-east of this area. Improved agricultural grassland is present to the west and south. Turbine 5 is located c. 400m from the Ballynamullagh Stream. It is also noted that Turbine 5 is located c. 384m from an unnamed stream to the south and c. 233m from the Coolree 07 Stream. The access road from T4 to T7 first passes north-east through an improved agricultural grassland field before crossing the 2nd order Ballynamullagh Stream (EPA Segment Code: 07_982). It then passes through the other side into a mosaic woodland habitat, with sections of coniferous and commercial forestry as well as some mixed broadleaved woodland. Turbine 6 is located c. 143m from the Ballynamullagh Stream and turbine 7 is located c 360m from this stream at its closest point. These turbines are located on the woodland habitats mentioned above. Site 6 is located downstream from here and the stream here is of similar character just much smaller. There is no salmonid spawning or nursery habitat present at this site. As with the rest of this stretch this is an overgrown, low-gradient degraded stream".

8.7.9.3 Desktop Study - Water Quality

8.7.9.3.1 Blackwater (Longwood) River

The Blackwater [Longwood] River (07B02) rises south west of Enfield, Co. Meath. The total channel length is approximately 24km. From the source, the river flows north as far as survey Site 1. From here it flows north-east past Enfield and north to its confluence with the River Boyne (Segment Code: 07B04). There are six EPA biological water quality monitoring stations on the River Blackwater [Longwood] that were recently monitored. The furthest upstream (Station Code: 07B02 0060) was rated Q3 in 2020; This station was located at Site 2. Another EPA station is located where the R402 crosses the Blackwater (Longwood) river. This station (Station Code: 07B02 0100) was rated Q3-4 in 2020. There is another monitoring site (Station Code: 07B02 0200) approximately 4km downstream that was rated Q3 in 2009.

The next EPA monitoring station (Station Code: 07B02 0300) is approximately 8km downstream from here. This site was rated Q3-4 in 2020. In 2003 another site 2km from here (Station Code: 07B02 0400) was rated Q3-4. The last EPA monitoring station (Station Code: 07B02 0600) is located where the R161 crosses the river approximately 200m upstream of the confluence with the Boyne. This site was rated Q3-4 in 2020.

The EPAs most recent assessment of the Blackwater [Longwood] River is as follows: " *The dominance of pollution tolerant and paucity of pollution sensitive macroinvertebrate taxa indicated unsatisfactory ecological conditions at all sites surveyed on the Blackwater (Longwood) River in 2020. Enriched conditions were evident with enhanced algal growth noted at all sites*".

All waterbodies in the Blackwater [Longwood] SC_010 sub catchment, except one are considered to be at risk. The majority of the survey sites are on waterbodies with a Water Framework Directive status of 'Poor'.

8.7.9.3.2 Mulgeeth River

The Mulgeeth River (EPA Code: 07M54) is a tributary of the Blackwater [Longwood] River]. The river rises in the Dunfierth Bog which is located just east of the proposed Drehid wind farm site. From here it flows south-east before turning sharply north-east to its confluence with the Blackwater [Longwood] River. The entire channel length is approximately 8rkm (river kilometres). There are no EPA biological monitoring stations on this watercourse.

8.7.9.3.3 Coolree 07 River

The Coolree River (EPA Code: 07C23) is a tributary of the Blackwater [Longwood] River. The entire channel length is approximately 10rkm. It rises to the south-west of Enfield and flows predominantly north-west until it's confluence with the Blackwater [Longwood] River. There are no EPA biological monitoring stations on this river. A section of this river and one of its tributaries, the Ballynamullagh River (EPA code: 07B19) flows along the proposed wind farm site.

The Coolree 07 River is also known as the Fear English River. The “Fear” part is locally pronounced “Fair” and it is understood that the name relates to the word “meadow”.

8.7.9.3.4 Ballynamullagh Stream

The Ballynamullagh Stream (EPA Code: 07B19) is also a tributary of the Blackwater [Longwood] River. The entire channel length is approximately 4rkm. This stream is also known as the Fear English River locally. The Ballynamullagh Stream rises ca. 1.2rkm south of the wind farm site. Immediately upstream of the boundary of the wind farm site the 1st order Drehid stream (EPA Code: 07D13) joins this watercourse. From here the Ballynamullagh stream flows north-east through the proposed wind farm site, before flowing north through the wind farm site. Approximately seven of the 11 proposed turbines are located in the vicinity of this watercourse, and it is proposed that access roads will cross this watercourse at three different points. Just south of the proposed Turbine 6 the Ballynamullagh Stream flows into the Coolree 07 River.

The EPA do not carry out biological monitoring on the Ballynamullagh Stream, presumably due to its small size.

8.7.9.4 Results of Aquatic Surveys

The survey sites are located on watercourses that both drain – or run close to - the proposed Drehid wind farm site. The watercourses surveyed are the Blackwater (Longwood) River, the Mulgeeth River, the Ballynamullagh Stream, the Drehid Stream and the Coolree 07 River. All of the sites are located within the Boyne catchment, and the Blackwater (Longwood) sub catchment. The survey sites are discussed in detail below with additional results provided in Appendix 8.1-7.

8.7.9.4.1 Site 1

approximately 4km south-east of Enfield, Co. Meath just off the L1004 road. The EPA do not monitor water quality this part of the river. There are three EPA stations upstream from here but they have not been monitored in recent years.

The section of river this site is located on is classified by the Water Framework Directive (WFD) as an “at risk” waterbody. The watercourse also has a WFD (2016-2021) Ecological Status or Potential status of `Poor’. This survey site is located to the north-east of the proposed development.

This site is located on a low gradient section of the 3rd order Blackwater (Longwood) River. This stretch of the river has been deepened and channelised in the past. The site was previously well shaded by riparian trees which overhung the watercourse along high banks. During the December 2023 survey it was apparent that extensive maintenance works had been undertaken along the channel at this site and the overhanging trees has been removed. There is no instream vegetation in the river at this location. The water is silted and slow flowing at this site. It was considered that the maintenance works had been completed recently.

This stretch of the river does not have any suitable spawning or nursery habitats for salmonids. There is potential lamprey nursery habitats and trout rearing and foraging habitats present. This channel has been further degraded by the recent maintenance works.

Brown Trout, Brook Lamprey, Three-spined Stickleback, Minnow (*Phoxinus Phoxinus*), and Stone Loach (*Barbatula barbatula*) were recorded during the 2019-2021 electro fishing surveys. These species are all still likely to be present. However, the removal of the overhanging trees will have negatively affected fish habitats and has caused further siltation in the river. Although White-clawed Crayfish have been recorded in this river previously, none found to be present at the site during the 2021 survey. Habitats for crayfish are very limited at this site due to the general absence of suitable refuges.

The estimated current Q-rating for this site based on 2023 surveys is 'Q3 – Moderately Polluted'. The overall status of this channel is rated as 'Moderate'. This stretch of the river has been further degraded by recent arterial drainage maintenance works.

8.7.9.4.2 Site 2

Site 2 is located 2km upstream of Site 1 on the Blackwater (Longwood) River (EPA segment code: 07_2240). The Blackwater [Longwood] River rises approximately 4km upstream of Site 2. The EPA carry out biological monitoring at this site (Station Code: 07B020060). It was rated as Q3 in 2020, which corresponds to WFD 'Poor' status. The site is classified by the WFD as an "at risk" waterbody and has a Water Framework Directive (2016-21) waterbody status of "Poor". The proposed development site is located to the west this site.

The water channel at this site is very narrow and channelised, flowing through agricultural land. It is evident that this section of the river has been well maintained in the past, and further channel maintenance works had recently been completed at the site. There was evidence of recent bank works and tree clearance, and a tracked machine was still present at the site when it was visited in December 2023. The gradient at this site was very low and siltation levels were high. This is a relatively featureless channel with no pool, riffle, glide sequences. This is an artifact of the arterial drainage scheme. The river is lined by high spoil heaps of material that was previously dredged from the river.

Brown Trout, Brook Lamprey, Minnow, Three-spined Stickleback, and Stone Loach were recorded during the 2021 electro fishing survey. The results were very similar to the previous 2019 survey and the numbers of all species recorded was low. These species are all still likely to be present – but this is a very degraded stretch of river and is subject to regular disturbance by maintenance activities. White-clawed Crayfish were recorded here in low numbers during the 2021 survey. Habitats for crayfish are very limited at this site due to the low instream physical diversity, and regular disturbance. They could still be present in very low numbers.

The estimated current Q-rating for this site based on 2023 surveys is 'Q3 – Moderately Polluted'. The overall status of this channel is rated as 'Poor'. This stretch of the river has been further degraded by recent / ongoing arterial drainage maintenance works.

8.7.9.4.3 Site 3

Site 3 is located on the 2nd order Mulgeeth River (EPA segment code: 07_1720). This watercourse rises in the Dunfierth Bog. This site is located approximately 3km upstream of Site 2. There is no EPA water quality monitoring station on this river. The section of river this site is located on is assessed by the WFD as an "at risk" waterbody. The watercourse has a Water Framework Directive (2016-2021) waterbody status of "Poor". The site is located to the south-east of the proposed development.

The Mulgeeth River channel at Site 3 is also subject to regular arterial drainage maintenance, and impacts and disturbance was apparent again in the December 2023 survey. The banks are hight and the gradient is low. The site is heavily silted, as was similarly noted in previous surveys.

The only species that was recorded at this site in the 2021 electrofishing survey were Three-spined Stickleback and Minnow which were recorded in small numbers. Lampreys and crayfish were never recorded at this site. It is unlikely that this has changed and the landowner at this site informed as that there were no fish at this site.

The estimated current Q-rating for this site based on 2023 surveys is 'Q3 – Moderately Polluted'. The overall status of this channel is rated as 'Poor'. There have not been any significant changes at this site since the 2021 survey.

8.7.9.4.4 Site 4

Site 4 was located on the 2nd order Mulgeeth River (EPA segment code: 07_1320). This site is approximately 2.5km upstream of Site 3. There are no EPA monitoring stations on this stretch of river. The site is assessed by the WFD as being an "at risk" waterbody. The watercourse has a Water Framework Directive (2016-2021) waterbody status of "Poor". This site is located to the south-east of the proposed development.

This channel has been dredged and channelised in the past, and is well maintained. The condition of this site is much the same as it was during the 2021 survey. The only species recorded at this site during the 2021 electrofishing survey was Three-spined Stickleback. This species was common at this location. This site is considered to be unsuitable for lampreys, salmonids, and crayfish.

The estimated current Q-rating for this site based on 2023 surveys is 'Q3 – Moderately Polluted'. The overall status of this channel is rated as 'Poor'. There have not been any significant changes at this site since the 2021 survey.

8.7.9.4.5 Site 5

Site 5 is located in Johnstown bridge on the 4th order Blackwater [Longwood] River (EPA segment code: 07_350). It is located downstream of an existing bridge where the R402 road crosses this watercourse. The EPA carries out biological monitoring at this site (Station Code: 07B020100). It was rated Q3 in 2020, corresponding to WFD status 'Poor'. The section of river this site is located on is classified by the WFD as an "at risk" waterbody. The watercourse also has a Water Framework Directive (2016-2021) waterbody status of "Poor Ecological Status (or Potential)". The site is located to the north of the proposed development.

The river at the site has been drained and channelised in the past, and water quality has declined since 2018. There were construction works underway with the building of a new sewage treatment works downstream of the site. There was evidence that machinery had crossed the river at the 2021 electrofishing site with tracks on both sides of the river leading to the waterline. This location was heavily impacted by cattle accessing the river for drinking in September 2021. The site is heavily silted.

During the 2021 electrofishing survey Salmon and Brook Lampreys were recorded in small numbers. This was the only site Salmon were recorded during the baseline surveys for the proposed development. Brown Trout, Three-spined stickleback, and Minnow were also recorded in small numbers. White-clawed Crayfish were recorded at this site in 2021, but not in 2019 and 2018. The numbers present are very low.

The estimated current Q-rating for this site based on 2023 surveys is 'Q3 – Moderately Polluted'. The overall status of this channel is rated as 'Poor'. There have not been any significant changes at this site since the 2021 survey, apart from the localised impacts of machines tracking across the river.

8.7.9.4.6 Site 6

Site 6 is located on the 3rd order Coolree 07 River (EPA segment code: 07_1848). It is located approximately 3 km upstream of Site 5. This site is assessed as an "at risk" waterbody by the WFD. The watercourse has a Water Framework Directive (2016-2021) waterbody status of "Poor". This site is located to the north-east of the proposed development.

This site is heavily silted and was recently subjected to arterial drainage maintenance. Dredging and removal of vegetation has occurred since the last survey. There is cattle access to the river which was also evident during previous surveys. Indeed, cattle were recorded in the river during both the 2019 and 2021 surveys. The heavy siltation at this site is due to livestock entering the river, and the upstream maintenance works.

Brown Trout, Minnow, Three-spined Stickleback and Stone Loach were recorded in low numbers during the September 2021 electrofishing survey. Nominal numbers of Brook lampreys were recorded at this site in 2018, but not in the subsequent surveys. This site was first surveyed by Ecofact in 2005 when it was considered to be "visibly polluted at the time of the survey".

The estimated current Q-rating for this site based on 2023 surveys is 'Q3 – Moderately Polluted'. The overall status of this channel is rated as 'Poor'. This stretch of the river has been further degraded by recent maintenance works.

8.7.9.4.7 Site 7

Site 7 was located on the 1st order Clonkeeran River (EPA segment code: 07_1287). There are no EPA monitoring stations on this river. The section of river this site is located on is classified as an "at risk" waterbody. The watercourse has a waterbody status of 'Poor'. This site is located to the west of the proposed development. The site is highly modified.

This site on the 1st order Clonkeeran River does not provide optimal aquatic habitat. The Clonkeeran River is also known locally as the "Sweep River". The origins of this name are unknown and it is a very small and low gradient stream, and does not have a significant flow. During the 2018 survey the site was dry. In 2019 there was a very small flow in the river, but not enough to provide substantial aquatic habitat. In 2021 the site was again dry and overgrown with briars and overhanging vegetation. In December 2023 there was a moderate flow in the river. It was obvious that recent maintenance works had been completed - vegetation cleared from the banks and some dredging had been undertaken. The channel was heavily silted.

The estimated current rating for this site based on 2023 surveys is "at risk". It is not suitable for applying a Q rating. The overall status of this channel is rated as 'Poor'. This stretch of the river has been further degraded by recent maintenance works.

8.7.9.4.8 Site 8

Site 8 is located a further c. 4km upstream from Site 6 on the first order Coolree 07 River (EPA segment code: 07_1230). There are no EPA biological water quality monitoring stations here. This section of the river is classified as an "at-risk" waterbody by the EPA and has a 'Poor' status. This site is located to the west of the proposed development.

The banks of the river at this site are high and overgrown with heavy vegetation. There is significant siltation at this site, and it is accessible to cattle, which are trampling through the watercourse and exacerbating the sediment issue. The only fish species recorded at this site during the 2019 and 2021 electrofishing surveys were Three-spined Sticklebacks.

During December 2023, water levels at this site were higher than in the previous year. There are a few areas of the channel in the upper Coolree 07 River catchment where there is at least some gradient and some run-type habitat present. It cannot be fully excluded that some trout might move upstream into a channel like this in wet years (like 2023). However, this would provide temporary habitat only in a wet year, and the trout present would be expected to leave or perish when more normal conditions return. Brown trout were not recorded in the two previous electrofishing surveys. The summer and autumn of 2023 were record wet periods, and it is to be expected that all watercourses were higher as a result. Obviously, a stream with more water provides better potential habitat. However, at best this watercourse could provide a marginal habitat for trout, and considering more typical water levels and water quality it would be a temporary one only.

The estimated current Q-rating for this site based on 2023 surveys is 'Q3 – Moderately Polluted'. The overall status of this channel is rated as 'Poor'. Water levels in this stretch were higher than what was observed in previous surveys. However, the overall evaluation of the channel/site remains the same.

8.7.9.4.9 Site 9

Site 9 was located on the 1st order Ballynamullagh Stream (EPA Segment Code: 07_801) approximately 590rm upstream of the proposed development site. There are no EPA monitoring stations on this watercourse. The EPA classifies this watercourse as being 'At Risk'. The Ballynamullagh Stream flows through the proposed development site and approximately 7 of the proposed 11 turbines are located in the lands surrounding this watercourse. Proposed access roads also cross the Ballynamullagh Stream at three different points.

The stream is very small at this site with overgrown banks. It does not provide suitable habitat for aquatic species. No fish were recorded during the electrofishing surveys completed in 2019 and 2021. The stream was slightly higher in December 2023 than in the previous surveys – but it was still very obvious that it could not provide a suitable habitat for fish.

The estimated current rating for this site based on 2023 surveys is "at risk". It is not suitable for applying a Q rating. The overall status of this channel is rated as 'Poor'. There have not been any significant changes at this site since the 2021 survey.

8.7.9.4.10 Site 10

Site 10 was located on the 2nd order Drehid River (EPA segment code: 07_800) approximately 570rm upstream of the proposed development site. There are no EPA monitoring stations on this watercourse. The section of river this site is located on is classified as an 'at risk' waterbody and has a Water Framework Directive (2016-2021) waterbody status of 'Poor'.

The Drehid River watercourse is largely concealed under heavy vegetation overhanging from high banks at both sides of the river. The site was dry during the 2021 current survey. In 2019 there was very little water and it was heavily silted. No fish were recorded and it was concluded that this stream does not provide any suitable habitat for any fish species. During the December 2023 survey the stream was higher than we had seen before, and there was a flow.

The estimated current rating for this site based on 2023 surveys is "at risk". It is not suitable for applying a Q rating. The overall status of this channel is rated as 'Poor'. This channel was dry during the 2021 survey, and there was a flow during December 2023. However, the site remains in a poor condition and does not provide a sufficient aquatic habitat to support any fish or other important aquatic organisms.

8.7.9.4.11 Sites A-D

Sites A-D were additional sites considered during the December 2023 survey. In the previous surveys in 2018, 2019 and 2021, sites located both downstream and upstream of these points were surveyed. Site A is located at the furthest upstream proposed crossing location along the Ballynamullagh (adjacent to Proposed Wind Farm site compound). Site B is located at the existing/proposed crossing point south of T3. Sites C and D were targeted to cover the section of the Ballynamullagh intersected by the proposed crossing between T4 and T7, with Site C located 76m upstream of this crossing and Site D located 170m downstream of this crossing.

Site 6 is located downstream of Sites A-D on the 3rd order Coolree 07 River. Sites 8, 9, and 10 are located upstream of Sites A-D on the Coolree 07 stream, Ballynamullagh stream, and Drehid stream respectively. Sites A-D are all located on the Ballynamullagh stream between Sites 6 and 8-10. Previous aquatic assessments had evaluated the river sections on which sites A-D are located through detailed examination of Sites 6 and 8-10. However, the addition of Sites A-D in December 2023 provides a higher level of resolution for the survey and provides additional confirmation of the previous evaluation based on survey of Sites 6 and 8-10. Sites A-D are all located on the same EPA river segment (07_864). See Figure 8-6 for locations of aquatic survey sites.

During December 2023 the channels between Sites 6, 8,9, and 10 were investigated, including Sites A-D. Water levels in this channel were higher than during the previous surveys. This was due to the current survey being completed in the winter when rainfall levels are generally higher. Moreover, the preceding 6 months had also been very wet and this resulted in most watercourses in the study area being much higher than during the previous visits. This was the case even though the current survey was preceded by a relatively dry two-week period. Therefore these channels were viewed at their best, with higher base flows and die back of algae/instream vegetation. However, they were still rated as being marginal habitats for salmonids, and unsuitable for species such as lampreys and crayfish. All proposed crossing points are located along this channel between Sites A-D.

Overall, the conclusion of the current updated survey of the upper Coolree 07 River is that the evaluation is the same. There are really no suitable salmonid habitats upstream of Kilshanroe bridge. Similarly, lampreys and crayfish have been confirmed absent from this area. The character of the river changes above Site 6 to a channelised drain-like watercourse with a mud substrate, and it becomes smaller and of less value to aquatic ecology as you move further upstream. In a wet year and in the winter months it can't be fully ruled out that some Brown Trout may move upstream. But this would be into degraded, marginal, and temporary habitats only.

The estimated quality rating for EPA river segment (07_864) where sites A-D are all located is "at risk". None of the sites are suitable for applying a Q rating. The overall status of this channel is rated as 'Poor'. There have not been any significant changes on this section of river since the 2021 survey, when sites both upstream and downstream of this river segment were surveyed using electrofishing.

8.7.9.4.12 Site E

This site was located on an unregistered watercourse. This means that it is not included in the EPA watercourse maps. Very small, ephemeral, watercourses are sometimes not included in the EPA maps. This is often the case for very small artificially created watercourses (e.g. drains) also. This site was visited during December 2023 and a watercourse is present at the site. This is a very small watercourse that is heavily modified and more like a drain than a stream. Even during December 2023 there was a minimal flow and this 'watercourse' can be expected to dry up. This site can't really be rated under any biological monitoring scheme as it does not qualify as a watercourse. But by any measures this would not meet anything higher than 'Poor Status'. This site does not provide any habitat that could support fish or other important aquatic organisms.

8.7.10 Habitat Evaluation

The following summary table outlines the ecological resources in the form of habitat types found at and adjacent to the Proposed Wind Farm. Key receptors as per NRA guidance for which impact assessment is to be carried out are also indicated. The habitat evaluation is detailed in Table 8-25.

Table 8-25: Habitat Evaluation

Habitat	NRA Evaluation	Rationale	Key Ecological Receptor
WD4 Conifer plantation	Local Importance (Lower Value)	Intensively managed for timber production, high degree of artificial characteristics, low species diversity.	No
WD2 Mixed broadleaved/conifer woodland	Local Importance (Higher Value)	More diverse and higher degree of semi-natural characteristics than pure conifer plantation. Overlapped by proposed infrastructure and bat felling buffers.	Yes
WD3 (Mixed) Conifer woodland	Local Importance (Higher Value)	Although atypical and arising from ecological disturbance, this habitat is relatively diverse and semi-natural compared with conifer plantation. Overlapped by proposed access track.	Yes
WS2 Immature woodland	Local Importance (Higher Value)	Previously covered by conifer plantation, current replanting with oak will result in semi-natural broadleaved woodland. Overlapped by proposed access track.	Yes
WN7 Bog woodland	Local Importance (Higher Value)	Although resulting from ecological disturbance, this pioneer woodland habitat is relatively diverse and semi-natural. Overlapped by proposed infrastructure and bat felling buffers.	Yes
WN7/WS1 Bog woodland/Scrub Mosaic	Local Importance (Higher Value)	Semi-natural pioneer woodland habitat. Overlapped by proposed access track.	Yes
WD4/WN7 Conifer plantation/Bog woodland Mosaic	Local Importance (Higher Value)	More diverse and higher degree of semi-natural characteristics than pure conifer plantation. Overlapped by proposed access track felling buffer.	Yes

Habitat	NRA Evaluation	Rationale	Key Ecological Receptor
WD1 Mixed broadleaved woodland	Local Importance (Higher Value)	Semi-natural woodland habitat. Substation abuts block of long-established woodland. Semi-mature oak plantation is overlapped by Northern access track.	Yes
WD1/WD4 Mixed broadleaved woodland/Conifer plantation Mosaic	Local Importance (Higher Value)	Mature broadleaved trees underplanted with Scots pine. Not overlapped by any proposed infrastructure.	No
WS1/GS2 Scrub/Dry meadows and grassy verges Mosaic	Local Importance (Higher Value)	Semi-natural habitat mosaic. Not overlapped by any proposed infrastructure.	No
GA1 Improved agricultural grassland	Local Importance (Lower Value)	Intensively managed agricultural habitat.	No
GS2 - Dry meadows and grassy verges	Local Importance (Higher Value)	Semi-natural habitat. Overlapped by northern site entrance and access track.	Yes
GA1/GS2 Improved agricultural grassland/ Dry meadows and grassy verges Mosaic	Local Importance (Higher Value)	Semi-natural agricultural mosaic. Not overlapped by any proposed infrastructure.	No
GA1/GS4 Improved agricultural grassland/Wet grassland Mosaic	Local Importance (Higher Value)	Semi-natural agricultural mosaic. Not overlapped by any proposed infrastructure.	No
HD1 Dense bracken	Local Importance (Higher Value)	Semi-natural mosaic. Not overlapped by any proposed infrastructure.	No
WS1/HD1 Scrub/Dense bracken Mosaic	Local Importance (Higher Value)	Semi-natural mosaic. Not overlapped by any proposed infrastructure.	No
GS2/GS3 Dry meadows and grassy verges/Dry-humid acid grassland Mosaic	Local Importance (Higher Value)	Semi-natural mosaic. Not overlapped by any proposed infrastructure.	No

Habitat	NRA Evaluation	Rationale	Key Ecological Receptor
PB1 Raised bog (Intact)	International Importance	Intact raised bog with high degree of natural features present. Adjacent to proposed turbines, hard standings, access roads and bat felling buffers. Not overlapped by Proposed Wind Farm infrastructure. Included as KER on a precautionary basis due to potential for indirect effects.	Yes
PB1 Raised bog (Drained)	National Importance	Partially intact, drained raised bog with high degree of natural features present. Near proposed T8 hard standing, access roads and bat felling buffers. Included as KER on a precautionary basis due to potential for indirect effects.	Yes
PB1 Raised bog (Intact Margin Remnant)	County Importance	Small area of intact but desiccated raised bog margin. Not overlapped by or adjacent to any proposed infrastructure. Included as KER on a precautionary basis due to potential for indirect effects.	Yes
HH3 Wet heath	Local Importance (Higher Value)	Semi-natural habitat. Not overlapped by any proposed infrastructure. Adjacent to T8 hard standing. Included as KER on a precautionary basis due to potential for indirect effects.	Yes
FL1 Dystrophic lakes	Local Importance (Higher Value)	Semi-natural habitat. Adjacent to T8 hard standing.	Yes
WS1/PB1 Scrub/Raised bog Mosaic	Local Importance (Higher Value)	Semi-natural habitat mosaic. Adjacent to T8 hard stand, within T8 bat felling buffer	Yes
WD3/PB1 Conifer woodland/Raised bog Mosaic	Local Importance (Higher Value)	Semi-natural habitat mosaic. Not overlapped by any proposed infrastructure.	No
WL1 Hedgerows	Local Importance (Higher Value)	Semi-natural habitat. Intersected/overlapped by proposed infrastructure and bat felling buffers.	Yes

Habitat	NRA Evaluation	Rationale	Key Ecological Receptor
WL2 Treelines	Local Importance (Higher Value)	Semi-natural habitat. Intersected by proposed infrastructure and overlapped by T11 bat felling buffer.	Yes
WL1/WL2 Hedgerows/Treelines Mosaic	Local Importance (Higher Value)	Semi-natural habitat. Intersected/overlapped by proposed infrastructure and bat felling buffers.	Yes
FW2 Depositing/lowland rivers	Local Importance (Higher Value)	Intersected at three separate points by proposed internal access track crossings. Proposed Wind Farm infrastructure is located in catchment.	Yes
FW4 Drainage ditches	Local Importance (Higher Value)	Intersected by proposed access roads, and overlapped by T5 hard standing and T4/T5 bat felling buffers.	Yes

8.7.11 Fauna Evaluation

The basis of impact assessment should be a determination of which ecological resources within the zone of influence of the Proposed Wind Farm are of sufficient value to be material in decision making and therefore, included in the assessment (NRA, 2009a and CIEEM, 2018). Table 8-26, below, outlines the key receptors selected for assessment and the rationale for same; taken from NRA guidance (NRA, 2009a).

Table 8-26: Summary of Fauna Evaluations

Species Name	Conservation Status	NRA Evaluation	Rationale	Key Ecological Receptor
Badger	Wildlife Acts Least Concern	National Importance	Confirmed present on site. Setts located within 30m of construction; one sett overlapped by proposed footprint; one sett overlapped by felling buffer.	Yes
Irish Hare	Wildlife Acts Annex V EU Habitats Directive Least Concern	National Importance	Observed on site. Noise may cause disturbance.	Yes

Species Name	Conservation Status	NRA Evaluation	Rationale	Key Ecological Receptor
Irish Stoat	Wildlife Acts Least Concern	National Importance	Irish stoat confirmed present, may occasionally visit the site woodland and trees. Noise and loss of forestry will cause some disturbance.	Yes
Otter	Wildlife Acts Annex II & IV EU Habitats Directive Least Concern	National Importance	Holts recorded in the vicinity of the Proposed Wind Farm. Otter and their breeding sites are protected under European Law. Noise may cause disturbance and water quality changes may lower prey availability further downstream.	Yes
Pine Marten	Wildlife Acts Annex V EU Habitats Directive Least Concern	National Importance	Pine marten forage within hedgerows and conifer plantation and loss of forestry will cause some disturbance.	Yes
Pygmy Shrew	Wildlife Acts Least Concern	National Importance	Pygmy shrew are likely to forage within the site and construction activities may cause some disturbance.	Yes
Red Deer	Wildlife Acts Least Concern	National Importance	Red deer are present at the site. Felling could cause some disturbance.	Yes
Hedgehog	Wildlife Acts Least Concern	National Importance	Hedgehogs are likely to use the site to forage, hibernate and breed. Noise may cause some disturbance as will the removal of hedgerow and treelines	Yes

Species Name	Conservation Status	NRA Evaluation	Rationale	Key Ecological Receptor
Red Squirrel	Wildlife Acts Near Threatened	National Importance	Red squirrel forage within the site's conifer plantations. One drey was noted during previous surveys outside the Proposed Wind Farm boundary north-west of T7. Current surveys recorded a high number of feeding signs in this area. Noise and loss of forestry will cause some disturbance.	Yes
Wood Mouse	Least Concern	National Importance	Wood mouse forage within the proposed site. Noise and loss of forestry will cause some disturbance.	Yes
Red Fox	Least Concern	Local Importance (Higher Value)	Widespread and resilient species.	No
Fallow deer	Wildlife Acts Least Concern	Local Importance (Lower Value)	Invasive species of High Impact.	No
Rabbit	Least Concern	Local Importance (Low Value)	Invasive species of Medium Impact.	No
American Mink	None	None	Invasive species associated with negative ecological impacts.	No
Brown Rat	None	None	Invasive species of no ecological value.	No
Grey Squirrel	None	None	Invasive species associated with negative ecological impacts.	No
House mouse	None	None	Invasive species of no ecological value.	No

Species Name	Conservation Status	NRA Evaluation	Rationale	Key Ecological Receptor
Brown long-eared bat	EU Habitats Directive Annex IV, Wildlife Acts, Least Concern	National Importance	Observed on site. Removal of trees will impact bats.	Yes
Leisler's bat	EU Habitats Directive Annex IV, Wildlife Acts, Least Concern	National Importance	Observed on site. Removal of trees will affect bats.	Yes
Common pipistrelle	EU Habitats Directive Annex IV, Wildlife Acts, Least Concern	National Importance	Observed on site. Removal of trees will affect bats.	Yes
Soprano pipistrelle	EU Habitats Directive Annex IV, Wildlife Acts, Least Concern	National Importance	Observed on site. Removal of trees will affect bats.	Yes
Nathusius' pipistrelle	EU Habitats Directive Annex IV, Wildlife Acts, Least Concern	National Importance	Observed on site. Removal of trees will affect bats.	Yes
Natterer's Bat	EU Habitats Directive Annex IV, Wildlife Acts, Least Concern	National Importance	Observed on site. Removal of trees will affect bats.	Yes
Whiskered Bat	EU Habitats Directive Annex IV, Wildlife Acts, Least Concern	National Importance	Observed on site. Removal of trees will affect bats.	Yes
Daubenton's Bat	EU Habitats Directive Annex IV, Wildlife Acts, Least Concern	National Importance	Observed on site. Removal of trees will affect bats. Potentially for effects via water quality changes.	Yes

Species Name	Conservation Status	NRA Evaluation	Rationale	Key Ecological Receptor
Common Frog	Wildlife Acts EU Habitats Directive Annex V Least Concern	National Importance	Observed within study area; Considered likely to occur throughout in suitable habitat.	Yes
Common Lizard	Wildlife Acts Least Concern	National Importance	Observed within the site.	Yes
Smooth Newt	Wildlife Acts Least Concern	National Importance	Desktop records in surrounding area	Yes
Barbut's Cuckoo Bee	Endangered	National Importance	Historical record at N755 335 – c. 1.1 km south-east of the site.	Yes
Gipsy Cuckoo Bee	Near threatened	National Importance	Historical record in linear woodland/scrub c. 288m from Proposed Wind Farm	Yes
Gooden's Nomad Bee	Endangered	National Importance	Conservation status and potentially suitable habitat in area of Proposed Wind Farm	Yes
Large Red Tailed Bumble Bee	Endangered	National Importance	Conservation status and potentially suitable habitat in area of Proposed Wind Farm	Yes
Patchwork leafcutter bee	Near threatened	National Importance	Conservation status and potentially suitable habitat in area of Proposed Wind Farm	Yes
Moss Carder-bee	Near threatened	National Importance	Lack of optimal habitat within site	No
Common Carder Bee	Least Concern	Local Importance (Higher Value)	Conservation status and lack of optimal habitat within site	No

Species Name	Conservation Status	NRA Evaluation	Rationale	Key Ecological Receptor
Marsh fritillary	Annex II EU Habitats Directive Vulnerable	National Importance	Larval webs and optimal habitat recorded adjacent to Proposed development (outside development boundary); larval food plant recorded in low-quality habitat close to access track	Yes
Dark Green Fritillary	Vulnerable	National Importance	Conservation status and presence of suitable habitat close to Proposed Wind Farm	Yes
Large Heath	Vulnerable	National Importance	Conservation status and presence of suitable habitat close to Proposed Wind Farm	Yes
Small Heath	Near threatened	National Importance	Conservation status and presence of suitable habitat close to Proposed Wind Farm	Yes
Dingy Skipper	Near threatened	National Importance	Conservation status and presence of suitable habitat close to Proposed Wind Farm	Yes
Common & Least Concern Butterfly Species	Least Concern	Local Importance (Higher Value)	Conservation status and lack of optimal habitat within site	No
Common & Least Concern Odonata Species	Least Concern	Local Importance (Higher Value)	Conservation status	No
Nemapogon koenigi	No red list assessment	National Importance	Rarity	Yes
Raft Spider	No red list assessment	Local Importance (Higher Value)	Suitable habitat is located outside Proposed Wind Farm footprint.	No

Species Name	Conservation Status	NRA Evaluation	Rationale	Key Ecological Receptor
Brook Lamprey	Annex II EU Habitats Directive Wildlife Acts	National Importance	Recorded within catchment downstream of Proposed Wind Farm	Yes
Three-spined Stickleback	Least Concern	Local Importance (Lower Value)	Species widely distributed and of low ecological value.	No
Brown Trout	Wildlife Acts	National Importance	Recorded within catchment area of Proposed Wind Farm	Yes
Salmon	Annex II EU Habitats Directive Wildlife Acts	National Importance	Recorded within catchment downstream of Proposed Wind Farm	Yes
Stone Loach	Non-native	Local Importance (Lower Value)	Non-native species of low ecological value.	No
Minnow	Non-native	Local Importance (Lower Value)	Non-native species of low ecological value.	No
White-clawed Crayfish	Annex II EU Habitats Directive Wildlife Acts	National Importance	Species not recorded during survey, previously recorded in catchment and may occur in low densities	Yes

8.8 Do Nothing Scenario

If the Proposed Wind Farm does not go ahead, it is likely that the land overlapped by the Proposed Wind Farm will continue to be used intensively for farming and forestry. Intensive land use tends to reduce biodiversity and tip habitats and ecosystems towards reduced complexity and resilience, reducing their ecological value.

8.9 Potential Effects on Biodiversity

The potential effects of the project are addressed in the following sections in terms of potential effects arising in both the construction, operational and decommissioning phases.

Within the impact assessment, the Proposed Substation (including grid connection) and Proposed Wind Farm (including TDR) are assessed separately in dedicated sections; however, they still collectively comprise a single project: the 'Proposed Wind Farm'.

8.9.1 Construction Phase

8.9.1.1 Designated Sites (Proposed Wind Farm & TDR)

8.9.1.1.1 European Sites

No European sites are overlapped by the Proposed Wind Farm infrastructure, Proposed Wind Farm development boundary or TDR. Therefore no direct effects are predicted during construction for these elements of the project.

An Appropriate Assessment Screening Report and Natura Impact Statement (NIS) have been prepared to provide the competent authority with the information necessary to complete an Appropriate Assessment for the proposed project in compliance with Article 6(3) of the Habitats Directive.

As per the EPA Guidance (2022), "a biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement" but should "incorporate their key findings as available and appropriate".

The Stage One Appropriate Assessment Screening report concluded that: In the absence of mitigation measures (which have not been considered at this screening stage), likely significant effects on the qualifying interests of the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA cannot be excluded on the basis of objective scientific information. A Natura Impact Statement has been completed in respect of:

- River Boyne and River Blackwater SAC (002299)
- River Boyne and River Blackwater SPA (004232)

The results of the s-p-r modelling process identified that - given the scale and nature of the potential sources identified, there are no likely significant effects identified for any other European sites not listed above. The AA screening process has considered potential effects which may arise during all phases of the proposed development (construction, operation and decommissioning). Through an assessment of the pathways for effects and an evaluation of the sources for impacts, taking account of the processes involved and the distance of separation from European sites, it has been evaluated that there are no likely significant effects on the qualifying interests, special conservation interest or the conservation objectives of any other European site.

A Natura Impact Statement was therefore prepared. The Natura Impact statement concluded that, in the light of the conclusions of the assessment on the implications for the European sites concerned (River Boyne and River Blackwater SAC, River Boyne and River Blackwater SPA) that the proposed project will not adversely affect the integrity of any European site either individually or in combination with other plans or projects.

8.9.1.1.2 Natural Heritage Areas or Proposed Natural Heritage Areas

Please note, the findings of the AA Screening/NIS report are referenced here to provide a summary of findings for European sites which overlap with National sites. This is not intended to replace assessment of National sites in their own right, which is also provided in this section.

A total of five pNHAs overlap European Sites for which no likely significant effects have been identified within the AA Screening Report:

- The Long Derries pNHA (000925)
- Ballynafagh Lake pNHA (001387)
- Ballynafagh Bog pNHA (000391)
- Mouds Bog pNHA (002331)
- Mount Hevey Bog pNHA (002342)

There are no NHAs or pNHAs that overlap European sites which were considered as part of the NIS.

The Natura Impact statement concluded that, in the light of the conclusions of the assessment on the implications for the European sites concerned (River Boyne and River Blackwater SAC, River Boyne and River Blackwater SPA) that the proposed project will not adversely affect the integrity of any European site either individually or in combination with other plans or projects.

The assessment of potential effects on National Sites arising from the construction of the Proposed Wind Farm is detailed in Table 8-27. Potential impact pathways have been assessed for all sites according to the source-pathway-receptor model, as detailed in Table 8-27.

Ballynafagh Bog pNHA (00391) is not hydrologically linked to the Proposed Wind Farm, although it has been noted that the site supports breeding Merlin. The potential effects to avian fauna including merlin during the construction phase of the Proposed Wind Farm is discussed in Chapter 8.2 Ornithology. Ballynafagh Bog pNHA is 8.7 km from the Proposed Wind Farm. Following SNH Guidance on Assessing Connectivity with Special Protection Areas (SPAs) (2016) merlin have a core range of 5km from their nest site during breeding season. Therefore, species recorded within the site are beyond the core range of merlin utilising this pNHA.

It is noted that no potential ecological links between the Proposed Wind Farm and Ballynafagh Lake pNHA exist regarding marsh fritillary. This is due to all suitable habitat areas and confirmed breeding areas being located outside the Proposed Wind Farm footprint and ZoI. While there are areas of Devil's bit scabious immediately adjacent to the proposed T7 - T8 access track, these smaller isolated patches along existing forestry tracks in wooded areas are sub-optimal for marsh fritillary, due to limited extent, lower density of devil's bit scabious and their location within woodland. The other conservation interests Ballynafagh lake pNHA, Alkaline Fens and Desmoulin's whorl snail do not have potential for any ecological linkages due to absence of a hydrological link, the occurrence of designated fen habitat being restricted within the pNHA boundary, and Desmoulin's whorl snail being restricted to discrete sites due to it's limited habitat preferences, diminutive size and inability to travel over large distances. As such there are no ecological links between the conservation interests of Ballynafagh Lake pNHA and the Proposed Wind Farm.

Table 8-27: Assessment of construction stage effects of Proposed Wind Farm on National Sites

Site	Features of interest	S-P-R assessment	Further Assessment Required?
Royal Canal pNHA (002103)	Aquatic Flora and Fauna, Corridor value	No hydrological connectivity or potential for interactions which could affect mobile species.	No
Carbury Bog NHA (001388)	Raised Bog Habitat	No downstream hydrological connectivity. Designated for habitat occurring within it's boundary, and as such is not susceptible to indirect effects from the Proposed Wind Farm	No
Grand Canal pNHA (002104)	Diversity of species, corridor value, Flora Protection Order Species	No hydrological connectivity or potential for interactions which could affect mobile species.	No
Ballina Bog pNHA (000390)	Raised Bog Habitat	No hydrological connectivity. Designated for habitat occurring within it's boundary, and as such is not susceptible to indirect effects from the Proposed Wind Farm	No
Hodgestown Bog NHA (001393)	Raised Bog Habitat	No downstream hydrological connectivity. Designated for habitats occurring within it's boundary, and as such is not susceptible to indirect effects from the Proposed Wind Farm	No
Donadea Wood pNHA (001391)	Two rare species of Myxomycete fungus and woodland	No downstream hydrological connectivity. Designated for habitats and species occurring within it's boundary, and as such is not susceptible to indirect effects from the Proposed Wind Farm	No
The Long Derries, Edenderry pNHA (000925) (also an SAC)	[6210] Orchid-rich Calcareous Grassland*	No hydrological connectivity. Designated for habitat occurring within it's boundary, and as such is not susceptible to indirect effects from the Proposed Wind Farm The AA screening report concluded that the Proposed Wind Farm will have no likely significant effect on this European site.	No
Ballynafagh Lake pNHA (001387)	[7230] Alkaline Fens [1016]	No hydrological connectivity.	No

Site	Features of interest	S-P-R assessment	Further Assessment Required?
(also an SAC)	Desmoulin's Whorl Snail (*Vertigo moulinsiana*) [1065] Marsh Fritillary (*Euphydryas aurinia*)	Potential for ecological connectivity via regional marsh fritillary population has been assessed. No potential for effects due to location of suitable habitat areas and confirmed breeding areas outside the Proposed Wind Farm footprint and ZoI. The AA screening report concluded that the Proposed Wind Farm will have no likely significant effects on this European site.	
Ballynafagh Bog pNHA (000391) (also an SAC)	[7110] Raised Bog (Active)* [7120] Degraded Raised Bog [7150] Rhynchosporion Vegetation Merlin	The Proposed Wind Farm is located outside the core foraging range of breeding merlin (5 km) (SNH, 2016) potentially utilising this pNHA. No hydrological connectivity. Designated for habitats occurring within it's boundary, and as such is not susceptible to indirect effects from the Proposed Wind Farm The AA screening report concluded that the Proposed Wind Farm will have no likely significant effects on this European site.	No
Molerick Bog NHA (001582)	Peatlands [4]	No hydrological connectivity. Designated for habitat occurring within it's boundary, and as such is not susceptible to indirect effects from the Proposed Wind Farm	No
Black Castle Bog NHA (000570)	Peatlands [4]	No downstream hydrological connectivity. Designated for habitat occurring within it's boundary, and as such is not susceptible to indirect effects from the Proposed Wind Farm	No
Mount Hevey Bog pNHA (001584) (also an SAC)	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120]	No downstream hydrological connectivity. Designated for habitats occurring within it's boundary, and as such is not susceptible to indirect effects from the Proposed Wind Farm The AA screening report concluded that the Proposed Wind Farm will have no likely significant effects on this European site.	No

Site	Features of interest	S-P-R assessment	Further Assessment Required?
	Depressions on peat substrates of the Rhynchosporion [7150]		
Ballynabarny Fen pNHA (001573)	Fen vegetation	No hydrological connectivity. Designated for habitat occurring within it's boundary, and as such is not susceptible to indirect effects from the Proposed Wind Farm	No
Rathmoylan Esker pNHA (000557)	Eskers Woodland	Designated for habitat occurring within it's boundary, and as such is not susceptible to indirect effects from the Proposed Wind Farm	No
Mouds Bog pNHA (002331) (also an SAC)	Active raised bogs [7110] Degraded raised bogs still capable of natural regeneration [7120] Depressions on peat substrates of the Rhynchosporion [7150]	No hydrological connectivity. Designated for habitats occurring within it's boundary, and as such is not susceptible to indirect effects from the Proposed Wind Farm The AA screening report concluded that the Proposed Wind Farm will have no likely significant effects on this European site.	No

8.9.1.1.3 Coillte Biodiversity Areas

The Dunfierth Coillte Biodiversity area is overlapped by proposed access tracks, turbine hard standings, berms and bat felling buffers. These project elements overlap both mature lodgepole pine and recently replanted Scots pine. The permanent infrastructure footprint will result in loss of 0.72 ha (2%) of this biodiversity area. The proposed berms and bat felling buffers which overlap 2.21 ha (7%) of this biodiversity area are not representative of hard infrastructure and will recolonise naturally and support short vegetation, and as such will still contribute to the overall extent of the biodiversity area post-construction. A such, the Proposed Wind Farm will result in the loss of 2 % of this biodiversity area, resulting in a *Long-term Not significant* effect.

A *Short-term Slight to Moderate* indirect effect on the raised bog within the Dunfierth Biodiversity area is predicted, based on road setback distance and floating construction method, shallow hard standing depth and use of piled foundations limiting the amount of excavation required for T9 and T10 located near the raised bog in this area. In addition, given the high degree of existing drainage proximal to this raised bog, any drainage effects arising from construction of turbines and roads are unlikely to increase existing drainage to a level which results in significant effects.

The Kilmurry Coillte Biodiversity area is overlapped by proposed access tracks and berms. These project elements overlap existing conifer woodland. A small area of bog woodland is also overlapped by a section of access track. The permanent infrastructure footprint will result in loss of 0.17 ha (1%) of this biodiversity area. The proposed berms and associated felling areas which overlap 0.36 ha (2%) of this biodiversity area are not representative of hard infrastructure and will recolonise naturally and support short vegetation, and as such will still contribute to the overall extent of the biodiversity area post-construction. A such, the Proposed Wind Farm will result in the loss of 1 % of this biodiversity area, resulting in a *Long-term Not significant* Reversible effect at the Local scale.

8.9.1.1.4 Rehabilitation of Adjacent Bord Na Móna Bog

The draft rehabilitation plan for Timahoe North Bog concluded that the progress of natural revegetation is sufficiently advanced to forego interventions such as drain blocking and rewetting. The Proposed Wind Farm is not anticipated to give rise to significant indirect effects on this bog, due to the road setback distance, use of floating road construction and presence of existing drainage.

8.9.1.2 Designated Sites (Proposed Substation & Grid Connection)

8.9.1.2.1 European Sites

The assessment of construction-stage effects on European Sites arising from construction of the Proposed Substation (including Grid Connection) is the same as the assessment for the Proposed Wind Farm detailed in Section 8.9.1.1.1 above.

8.9.1.2.2 Natural Heritage Areas or Proposed Natural Heritage Areas

The assessment of construction-stage effects on National Sites arising from construction of the Proposed Substation (including Grid Connection) is the same as the assessment for the Proposed Wind Farm detailed in Section 8.9.1.1.2 above.

8.9.1.3 Habitats (Proposed Wind Farm & TDR)

8.9.1.3.1 Potential Direct Effects (Habitat Loss/Alteration)

Habitat types identified within the study area are illustrated in Figure 8-9.

Construction of the wind farm will lead to some permanent loss of habitat. The habitat loss will be the total area covered by wind farm infrastructure and associated felling buffers. Specifically, the proposed wind farm infrastructure comprises the temporary compounds, internal access tracks, construction access tracks, turbine foundations, turbine hard standings and associated drainage and landscaping features. The felling buffers are comprised of the proposed internal access track corridors and bat felling buffers around individual turbines. It is noted that semi-natural habitats will persist within bat felling buffers in wooded habitats, resulting in part of the overall habitat loss being comprised of alteration rather than complete loss of semi-natural habitats.

Tree canopy and hedgerow trimming is required along the turbine delivery route. A section of WL1 Hedgerow is required to be removed to form the southern site entrance, while a section of WL1/WL2 Treeline/Hedgerow Mosaic is required to be removed to form the northern site entrance (both entrances will be used for turbine deliveries). Tree canopy trimming will affect WL1/WL2 Hedgerow/Treeline Mosaic and WL2 Treelines at TDR POIs as per Table 8-11. Other habitats affected by the TDR are WL1 Hedgerows, GA2 Amenity grassland, WS3 Ornamental/non-native shrub, ED2 Spoil and bare ground, GS2 Dry meadows and grassy verges and WS1 Scrub. These habitats sill be subject to *Short-term Not significant* effects arising from TDR works including vegetation trimming, tree pruning and installation of temporary load-bearing surfaces. The effect of WL1 Hedgerow (16m) and WL1/WL2 Treeline/Hedgerow Mosaic (17m) removal to create site the northern and southern site access gates will be a *Long-term Slight* Reversible effect at the Local scale due to the limited scale of habitat loss at these points.

The total predicted habitat loss as a result of the Proposed Wind Farm is 27.68 ha or c. 7.5 % of the total habitat survey study area; of this, 80 % of the land-take is from habitats classified as low ecological value (dominated by conifer plantation and agricultural grassland).

The majority of wooded habitat loss is comprised of WD4 Conifer plantation (14.47% of total habitat area). There will be a permanent loss of 2.6 ha of this habitat within the proposed infrastructure footprint, in addition to felling of 11.22 ha for buffers; however, this habitat is not of high ecological value and therefore the effect is deemed to be *Long-term Slight* Reversible effect at the Local scale.

Non-wooded habitat loss is comprised of GA1 Improved agricultural grassland and BC1 Arable crops. There will be a permanent combined loss of 5.98 ha these habitats; however, these habitat are not of high ecological value and therefore the effect is deemed to be *Long-term Slight* Reversible effect at the Local scale.

It is noted that total felling of wooded habitats associated with the proposed wind farm is 25.3 ha, comprised of 7.2 ha within the infrastructure footprint and 18.1 ha of felling associated with buffers (bat buffers, access track, corridors, etc). Within the 17.75 ha of buffer felling, c. 8.63 ha is comprised of bat/turbine buffers which will be maintained as tree and scrub -free and zones for the operational phase (to be maintained by mechanical means only; use of herbicides is not permitted). The majority of the remaining 9.12 ha (51%) of buffer felling areas will be available for replanting and / or natural recolonisation during the operational phase.

PB1 Raised Bog (including all raised bog habitats: intact raised bog, drained raised bog and intact raised bog margin remnant): No land take therefore no direct effect is predicted.

HH3 Wet heath: No land take therefore no direct effect is predicted.

GS2 - Dry meadows and grassy verges: Magnitude of habitat loss (0.03 ha or 4% of total for this habitat within study area) is low; the resulting effect is *Long-term Slight* Reversible effect at the Local scale.

WD2 Mixed broadleaved/conifer woodland: Magnitude of habitat loss (3.25 ha or 14% of total for this habitat within study area) is low; the resulting effect is *Long-term Slight* Reversible effect at the Local scale.

WD3 (Mixed) Conifer woodland: Magnitude of habitat loss (1.32 ha or 8% of total for this habitat within study area) is low; the resulting effect is *Long-term Slight* Reversible effect at the Local scale.

WS2 Immature woodland: Magnitude of habitat loss (0.32 ha or 16% of total for this habitat within study area) is low; the resulting effect is *Long-term Slight* Reversible effect at the Local scale.

WN7 Bog woodland: Magnitude of habitat loss (1.31 ha or 13% of total for this habitat within study area) is low; the resulting effect is *Long-term Slight* Reversible effect at the Local scale.

WN7/WS1 Bog woodland/Scrub Mosaic: Magnitude of habitat loss (0.16 ha or 3% of total for this habitat within study area) is low; the resulting effect is *Long-term Slight* Reversible effect at the Local scale.

WD4/WN7 Conifer plantation/Bog woodland Mosaic: Magnitude of habitat loss (0.18 ha or 6% of total for this habitat within study area) is low; the resulting effect is *Long-term Slight* Reversible effect at the Local scale.

WD1 Mixed broadleaved woodland: Magnitude of habitat loss (0.65 ha or 9% of total for this habitat within study area) is low; the resulting effect is *Long-term Slight* Reversible effect at the Local scale.

Bog Pools (FL1 Dystrophic lakes established on part of cutaway bog): No land take therefore no direct effect is predicted.

WS1/PB1 Scrub/Raised bog Mosaic: Magnitude of habitat loss (0.33 ha or 68% of total for this habitat within study area) is relatively high on a purely numerical basis. However, it is noted that this habitat loss relates to the removal of invading scrub from drained raised bog overlapped by the T8 bat buffer, and as such the underlying vegetation will be retained. The removal of scrub from this habitat mosaic will have a *Moderate Positive* Reversible effect at Local scale over the Long Term.

WL1 Hedgerows: Loss of 16m of hedgerow at the main site entrance will occur.

WL2 Treelines: Length of linear habitat loss (70m or 3% of total length for this habitat within study area) is low; the resulting effect is *Long-term Slight* Reversible effect at the Local scale.

WL1/WL2 Hedgerows/Treelines Mosaic: (690m or 5% of total length for this habitat within study area) is moderate; the resulting effect is a *Long-term Moderate* Reversible effect at the Local scale. prior to mitigation.

FW2 Depositing/lowland rivers: It is proposed to use clear span bridges to cross these habitats. This will not necessitate instream land take therefore no direct effect is predicted.

FW4 Drainage ditches: Length of linear habitat loss (356 m or 5% of total length for this habitat within study area) affecting this artificial habitat is low-moderate; the resulting effect is *Long-term Sligh* Reversible effect at the Local scale.

Table 8-28 Loss of Key Habitat Receptors Due to Construction Land take (Proposed Wind Farm) and associated felling

Habita	Area loss in Hectares (ha)/Length in metres	Percentage Loss of Total Habitat Type within Survey Area	Evaluation
PB1 Raised Bog	0 ha	0%	National/ International Importance
GS2 - Dry meadows and grassy verges	0.03 ha	4 %	Local Importance (Higher Value)
WD2 Mixed broadleaved/conifer woodland	3.25 ha	14%	Local Importance (Higher Value)

Habita	Area loss in Hectares (ha)/Length in metres	Percentage Loss of Total Habitat Type within Survey Area	Evaluation
WD3 (Mixed) Conifer woodland	1.32 ha	8%	Local Importance (Higher Value)
WS2 Immature woodland	0.32 ha	16%	Local Importance (Higher Value)
WN7 Bog woodland	1.31 ha	13%	Local Importance (Higher Value)
WN7/WS1 Bog woodland/Scrub Mosaic	0.16 ha	3%	Local Importance (Higher Value)
WD4/WN7 Conifer plantation/Bog woodland Mosaic	0.18 ha	9%	Local Importance (Higher Value)
WD1 Mixed broadleaved woodland	0.65 ha	6%	Local Importance (Higher Value)
FL1 Dystrophic lakes	0 ha	0%	Local Importance (Higher Value)
WS1/PB1 Scrub/Raised bog Mosaic	0.33 ha	68 %	Local Importance (Higher Value)
WL1 Hedgerows	16 m	0.4 %	Local Importance (Higher Value)
WL2 Treelines	70 m	3 %	Local Importance (Higher Value)
WL1/WL2 Hedgerows/Treelines Mosaic	690 m	5%	Local Importance (Higher Value)
FW2 Depositing/lowland rivers	0 m	0 %	Local Importance (Higher Value)

Habita	Area loss in Hectares (ha)/Length in metres	Percentage Loss of Total Habitat Type within Survey Area	Evaluation
FW4 Drainage ditches	356 m	5 %	Local Importance (Higher Value)

8.9.1.3.2 Potential Indirect Effects

8.9.1.3.2.1 Raised Bog and Wet Heath

Areas of raised bog, both intact and semi-intact are present adjacent to the Proposed Wind Farm. These areas include the priority habitat Active Raised Bog. No works are proposed in these habitats and the proposed infrastructure layout has been designed to mitigate potential effects through avoidance.

Distances from infrastructure to raised bog habitats are as follows:

Turbine T9 is located 27m away from the active raised bog. The T9 hard stand is 15m from the bog. T10 is located 30m from the bog. The main T10 hard stand is located 8m from the bog at it's closest point. A minor peripheral pad of the T10 hard standing is located 3m from the bog (see Figure 8-9).

A short section of access road passes within 4m of the bog at it's closest point (the majority of the T9 - T10 access track is between 14 - 34m from the bog) (see Figure 8-9).

A section of the proposed access track between T9 - T8 runs parallel to the drained semi-intact raised bog at a distance of 40m north-west from the bog. This track then continues from T8 towards T7, also running 40m from a smaller area of drained semi-intact raised bog. Turbine T8 is located c. 80m from this habitat. The main T8 hard stand is 44m from this habitat. A minor peripheral pad of the T8 hard standing measuring is located 18m from this habitat (see Figure 8-9).

The design of turbine foundations and hard standings for T8 - T10 seeks to minimise indirect effects through the use of piled foundations, which will greatly reduce the required excavation depth for the foundations and hard standings for these turbines. The proposed depth of excavation required for the anchored turbine foundations is 3m, and 0.3m for hard standings. The piled foundations will be sunk to competent ground, which is expected to be impermeable till. All proposed access tracks will be floated, with minimal excavation for clearance and levelling only. As such, the potential for indirect effects to raised bog habitats during construction will be minimised.

The creation of a hydraulic connection between subsoil sub crops and marginal drains, lowering the regional groundwater table and hence resulting in water loss from the main bog body has been observed at Clara Bog Co. Offaly (Regan and Johnston, 2010); however, this phenomenon was based on hydrogeological conditions unique to Clara Bog including protrusions of glacial till through impermeable lacustrine clay providing a connection between the bog and underlying groundwater.

Due to the shallow depth of excavations proposed for T8-T10 which will be entirely within the peat layer, the use of narrow piles rather than open excavations to achieve foundation depth and strength/stability, and the expected underlying impermeable till layer, it is highly unlikely that the scenario observed at Clara Bog could occur.

Although considered unlikely, should the raised bog present exhibit ground water dependency similar to that at Clara Bog, which could be affected through piling works within high permeability strata at the periphery of the raised bog then said activities could affect the eco-hydrology of the bog. It should be noted however that this would be dependent on a number of factors including the presence of artesian conditions within the adjacent high bog, gravel sub crops protruding through lacustrine clay and said sub crops containing groundwater possibly fed from higher elevations. As noted previously, it is assessed that such conditions are not likely to exist at the Proposed Wind Farm.

In addition, literature on wetland ecology and management suggests that open ditches exhibit relatively small rates of drawdown at distances of >10m and closed ditches reveal much more modest drops in water table levels (Price et al., 2003) suggesting drainage effects associated with the Proposed Wind Farm are unlikely to contribute additively to groundwater drawdown. Given the high degree of existing drainage proximal to the identified active raised bog areas, the drainage measures and effects of excavation outlined for the current project during both construction and operational phases (see Chapter 9: Hydrology and Water Quality and Chapter 8: Land, Soils and Geology) will not result in marked changes to the existing local hydrological conditions or significant effects indirect on raised bog.

Wet heath near T8 could potentially be subject to similar effects; however, the limited scale and depth of excavation required in this area similarly reduces potential for drying out effects.

8.9.1.3.2.2 Depositing/Lowland Rivers

Indirect effects to lowland rivers such as sedimentation or pollution could occur prior to mitigation. The design includes a 50m buffer between infrastructure and the watercourses in and around the Proposed Wind Farm, except where crossings are required. In addition, clear span bridges are proposed at each of the three crossing points over the Fear English River to prevent the need for instream works. Potential effects in this category are likely to be *Short-term,* but potentially *Significant* Reversible effect at the Local scale prior to mitigation.

8.9.1.3.2.3 Drainage Ditches

Indirect effects to drainage ditches such as sedimentation or pollution could occur prior to mitigation. Potential effects in this category are likely to be *Short-term Moderate Reversible Local*. Potential *Short-term Significant Reversible Local* indirect Reversible effects could occur in the event that pollution of downstream streams or rivers occurred (prior to mitigation).

8.9.1.3.2.4 Dystrophic Lake

A relatively small area of open water exists near T8, where emergent vegetation is present, and the habitat appears to be regenerating with *Sphagnum cuspidatum* covering a large area. The T8 access road and turbine hard standing are present to the north of this area and indirect water quality effects could occur during construction in the absence of mitigation measures. Potential effects in this category are likely to be *Short-term Significant* Reversible effect at the Local scale (prior to mitigation).

8.9.1.4 Habitats (Proposed Substation & Grid Connection)

Habitat types identified within the study area are illustrated in Figure 8-9.

Construction of the Proposed Substation (including Grid Connection) will lead to some permanent loss of habitat. The total predicted habitat loss as a result of the Proposed Substation is 3.71 ha or c. 1 % of the habitat survey study area; of this, 29 % of the land-take is from habitat classified as low ecological value (conifer plantation).

The majority of habitat loss is comprised of WD2 Mixed broadleaved/conifer woodland. There will be a permanent loss of 1.72 ha this habitat; the effect is deemed to be a *Permanent Slight* but Reversible effect at the Local scale.

WD1 Mixed broadleaved woodland: Magnitude of habitat loss (0.22 ha or 2% of total WD1 in study area) is low; there is also a risk of root disturbance due to close proximity of this habitat to the east of the substation, however the mature trees making up this area of habitat in the will be retained. The resulting effect is a *Permanent Slight* but Reversible effect at the Local scale.

WL1 Hedgerows: Length of linear habitat loss (9m) is negligible; the resulting effect is a *Long-term Imperceptible* Reversible effect at the Local scale. .

Non-wooded habitat loss is comprised of GA1 Improved agricultural grassland. There will be a permanent loss of 0.53 ha of this habitat associated with the gid connection and access track; however, this habitat is not of high ecological value and considering the limited amount of loss the effect is deemed to be a *Short-term Imperceptible* Reversible effect at the Local scale.

Table 8-29: Loss of Key Habitat Receptors Due to Construction Land take (Proposed Substation & grid connection)

Habitat	Area loss in Hectares (ha)/Length in metres	Percentage Loss of Total Habitat Type within Survey Area	Evaluation
WD2 Mixed broadleaved/conifer woodland	1.72	7%	Local Importance (Higher Value)
WD1 Mixed broadleaved woodland	0.22	2%	Local Importance (Higher Value)
WL1 Hedgerows	9m	0.2%	Local Importance (Higher Value)

8.9.1.4.1 Potential Indirect Effects

8.9.1.4.1.1 Mixed broadleaved woodland

An area of long-established woodland with mature broadleaved trees is present in close proximity to the east of the Proposed Substation. Potential damage to the roots of mature broadleaved trees in this area could impair trees' ability to take in nutrients by reducing their root network. Potential root damage associated with construction of the substation access track is anticipated to be limited to a relatively low proportion of the overall root mass of adjacent mature broadleaved trees in this area (located between 3.5 - 9m from the access track) and any potentially affected trees are predicted to survive any potential limited root damage and recover. Potential effects in this category are assessed as *Medium-term Slight* Reversible effect at the Local scale.

8.9.1.4.1.2 Drainage Ditches

Indirect effects to drainage ditches could occur prior to mitigation. Potential effects in this category are likely to be *Short-term Moderate* Reversible effects at the Local scale.

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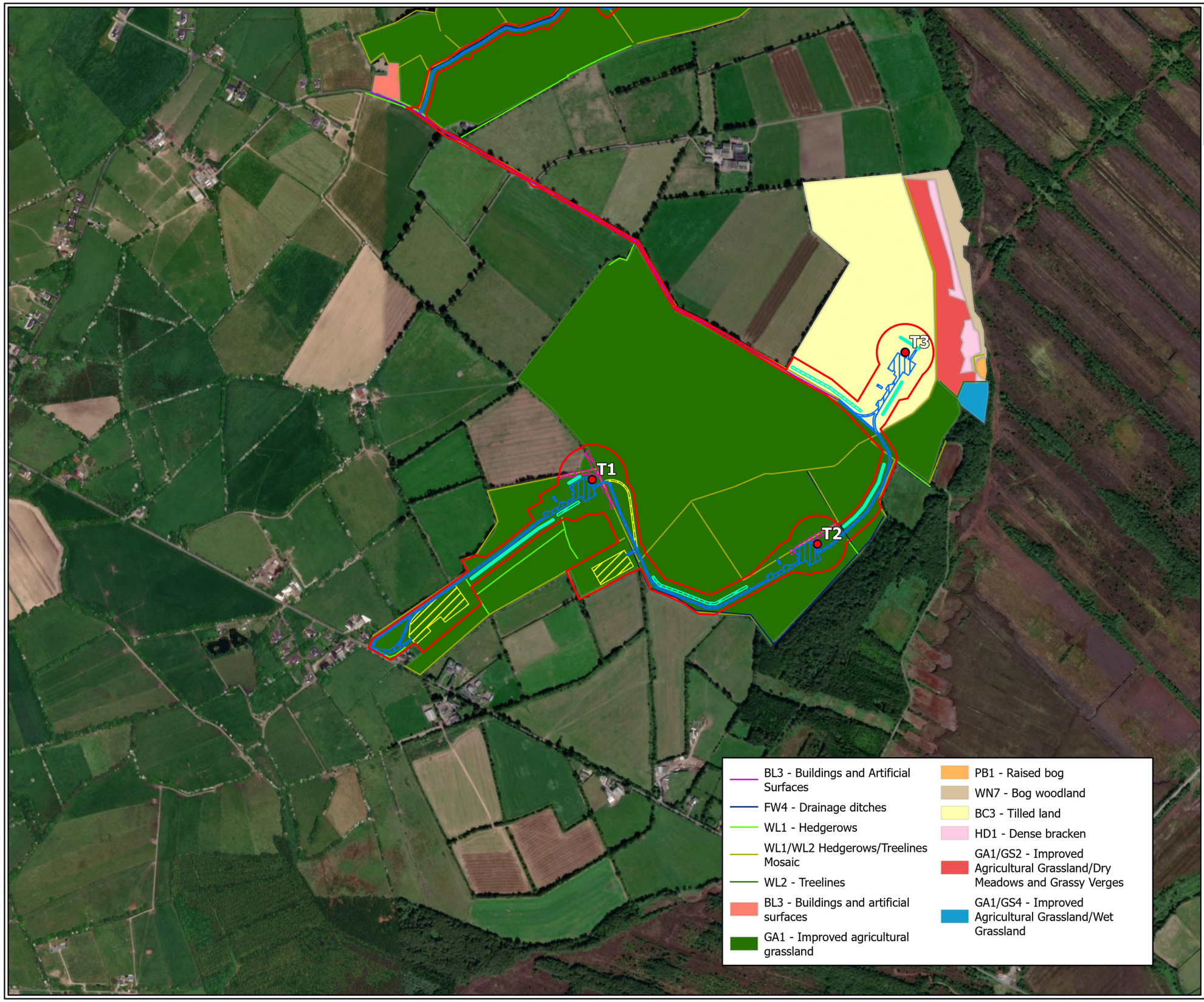

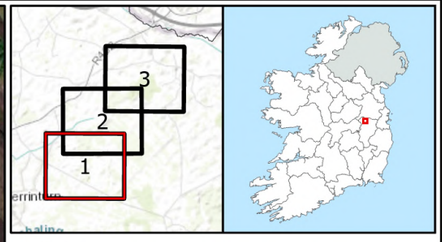

Legend

- Proposed Development Boundary
- Wind Farm Permanent Footprint
- Wind Farm Temporary Compound & Blade Transfer Area
- Wind Farm Felling Outside Permanent Footprint
- Wind Farm Berm Footprints in Open Habitats
- Turbines

- BL3 - Buildings and Artificial Surfaces
- FW4 - Drainage ditches
- WL1 - Hedgerows
- WL1/WL2 Hedgerows/Treelines Mosaic
- WL2 - Treelines
- BL3 - Buildings and artificial surfaces
- GA1 - Improved agricultural grassland
- PB1 - Raised bog
- WN7 - Bog woodland
- BC3 - Tilled land
- HD1 - Dense bracken
- GA1/GS2 - Improved Agricultural Grassland/Dry Meadows and Grassy Verges
- GA1/GS4 - Improved Agricultural Grassland/Wet Grassland

N W E S

0 0.25 0.5 1 Kilometers

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PROJECT:	Drehid Wind Farm and Substation		
FIGURE NO:	8.11		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:10,000	**REVISION:**	0
DATE:	22/05/2025	**PAGE SIZE:**	A3

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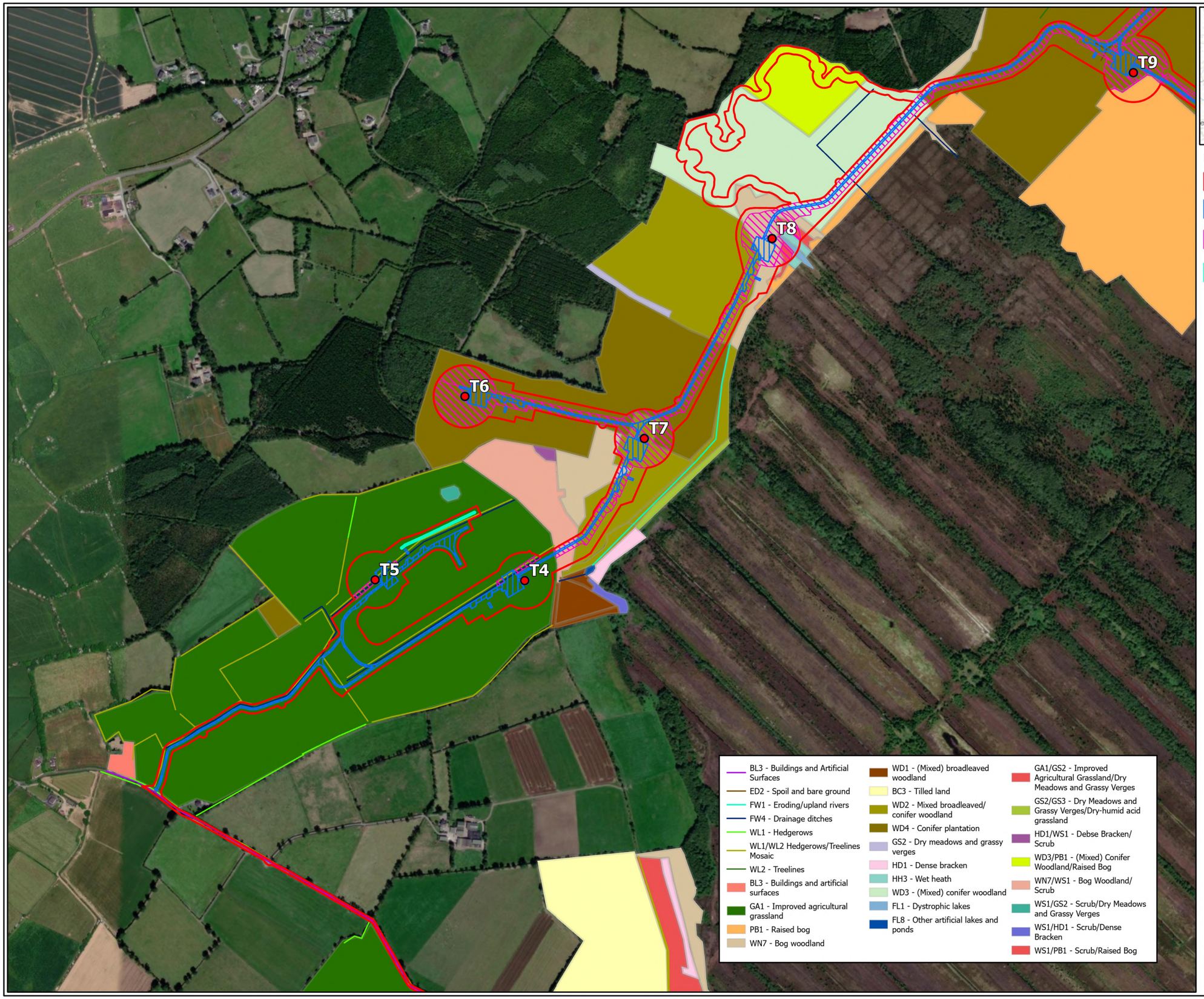

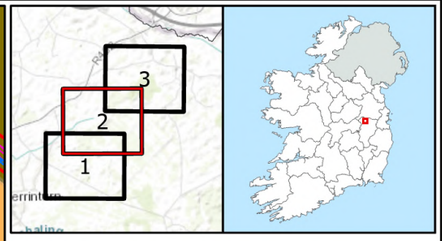

Legend

- Proposed Development Boundary
- Wind Farm Permanent Footprint
- Wind Farm Felling Outside Permanent Footprint
- Wind Farm Berm Footprints in Open Habitats
- Turbines

- BL3 - Buildings and Artificial Surfaces
- ED2 - Spoil and bare ground
- FW1 - Eroding/upland rivers
- FW4 - Drainage ditches
- WL1 - Hedgerows
- WL1/WL2 Hedgerows/Treelines Mosaic
- WL2 - Treelines
- BL3 - Buildings and artificial surfaces
- GA1 - Improved agricultural grassland
- PB1 - Raised bog
- WN7 - Bog woodland
- WD1 - (Mixed) broadleaved woodland
- BC3 - Tilled land
- WD2 - Mixed broadleaved/ conifer woodland
- WD4 - Conifer plantation
- GS2 - Dry meadows and grassy verges
- HD1 - Dense bracken
- HH3 - Wet heath
- WD3 - (Mixed) conifer woodland
- FL1 - Dystrophic lakes
- FL8 - Other artificial lakes and ponds
- GA1/GS2 - Improved Agricultural Grassland/Dry Meadows and Grassy Verges
- GS2/GS3 - Dry Meadows and Grassy Verges/Dry-humid acid grassland
- HD1/WS1 - Debse Bracken/ Scrub
- WD3/PB1 - (Mixed) Conifer Woodland/Raised Bog
- WN7/WS1 - Bog Woodland/ Scrub
- WS1/GS2 - Scrub/Dry Meadows and Grassy Verges
- WS1/HD1 - Scrub/Dense Bracken
- WS1/PB1 - Scrub/Raised Bog

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TITLE:	Habitat Loss		
PROJECT:	Drehid Wind Farm and Substation		
FIGURE NO:	8.11		
CLIENT:	North Kildare Wind Farm Ltd.		
SCALE:	1:10,000	**REVISION:**	0
DATE:	12/05/2025	**PAGE SIZE:**	A3

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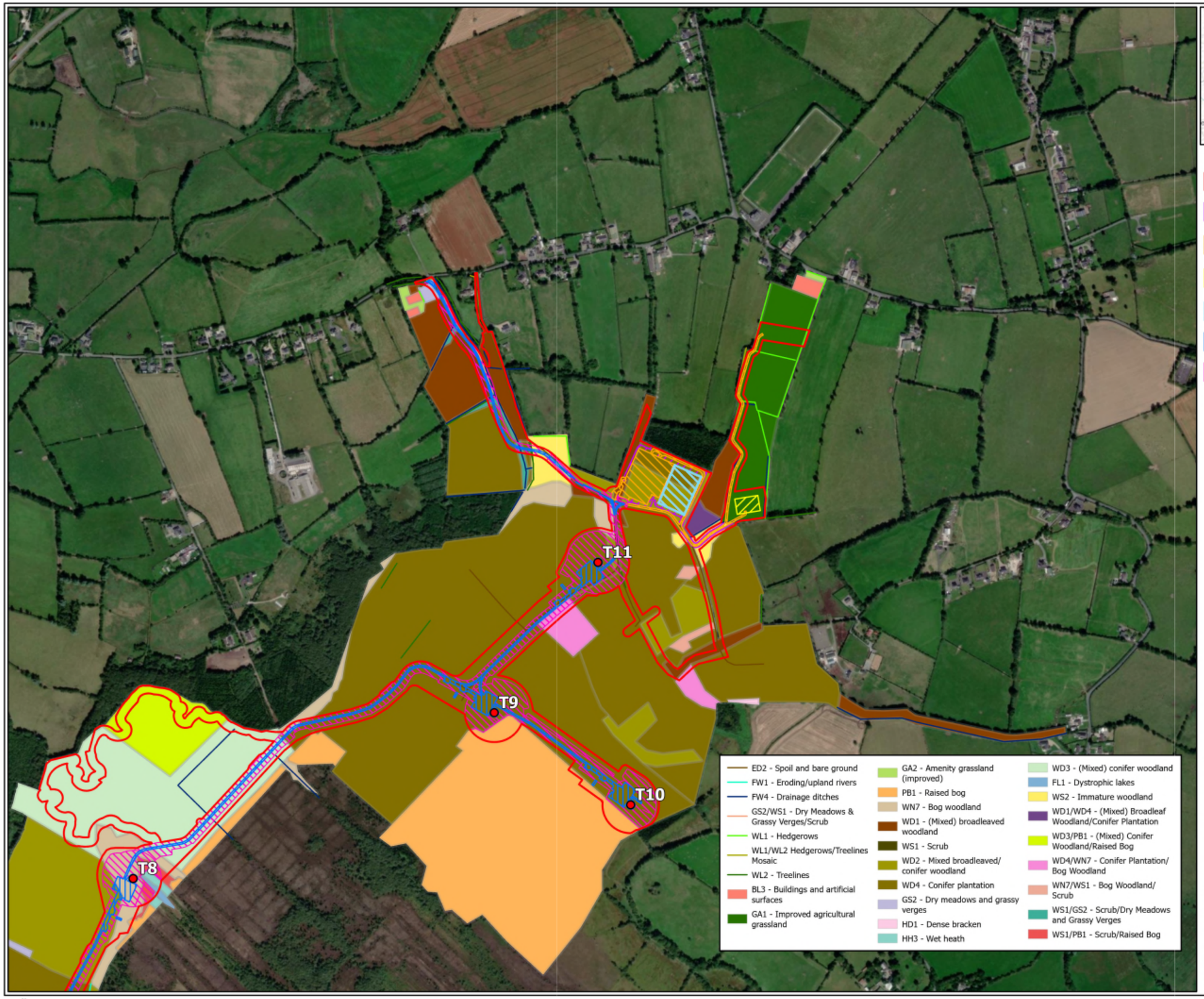

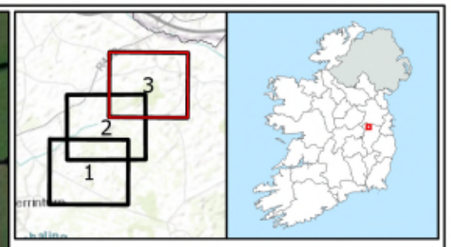

Legend

- Proposed Development Boundary
- Substation/Grid Felling Outside Permanent Footprint
- Substation/Grid Connection Permanent Footprint
- Substation/Grid Connection Temporary Compound
- Peat Deposition Area Permanent Footprint
- Wind Farm Permanent Footprint
- Wind Farm Felling Outside Permanent Footprint
- Turbines

- ED2 - Spoil and bare ground
- FW1 - Eroding/upland rivers
- FW4 - Drainage ditches
- GS2/WS1 - Dry Meadows & Grassy Verges/Scrub
- WL1 - Hedgerows
- WL1/WL2 Hedgerows/Treelines Mosaic
- WL2 - Treelines
- BL3 - Buildings and artificial surfaces
- GA1 - Improved agricultural grassland
- GA2 - Amenity grassland (improved)
- PB1 - Raised bog
- WN7 - Bog woodland
- WD1 - (Mixed) broadleaved woodland
- WS1 - Scrub
- WD2 - Mixed broadleaved/ conifer woodland
- WD4 - Conifer plantation
- GS2 - Dry meadows and grassy verges
- HD1 - Dense bracken
- HH3 - Wet heath
- WD3 - (Mixed) conifer woodland
- FL1 - Dystrophic lakes
- WS2 - Immature woodland
- WD1/WD4 - (Mixed) Broadleaf Woodland/Conifer Plantation
- WD3/PB1 - (Mixed) Conifer Woodland/Raised Bog
- WD4/WN7 - Conifer Plantation/ Bog Woodland
- WN7/WS1 - Bog Woodland/ Scrub
- WS1/GS2 - Scrub/Dry Meadows and Grassy Verges
- WS1/PB1 - Scrub/Raised Bog

N W E S

0 0.25 0.5 1 Kilometers

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8.9.1.5 Rare Plant Species (Proposed Wind Farm & TDR)

No contemporaneous rare plant records overlap the Proposed Wind Farm, and higher value and potentially suitable habitats such as raised bog have been intentionally avoided. As such, no effects on rare plant species are predicted.

8.9.1.6 Rare Plant Species (Proposed Substation & Grid Connection)

No contemporaneous rare plant records overlap the Proposed substation (including Grid Connection), and higher value and potentially suitable habitats such as raised bog have been intentionally avoided. As such, no effects on rare plant species are predicted.

8.9.1.7 Invasive Plant Species (Proposed Wind Farm & TDR)

A total of five invasive species were recorded during surveys.

The Schedule III species *Rhododendron ponticum* was recorded in mixed broadleaved/conifer woodland in the vicinity of the proposed T8 hard standing south of T8 (c. 18m from proposed T8 hard standing/8m from hard standing felling buffer) (within development boundary), and also recorded in conifer plantation c. 170m north-east of T9 (outside development boundary). Cherry laurel is present along the TDR, and could potentially be introduced to the wooded habitats onsite. In the event of Rhododendron or cherry laurel being spread to wooded habitats or bogs at the site due to proposed works, *Long-term Significant* Reversible effects at the Local could occur.

The spread of sycamore, butterfly bush, and snowberry (all present within development boundary) due to movement of vector material could give rise to *Long-term Moderate* Reversible effects at the Local scale. The potential effect of Lawson cypress spreading due to movement of vector material is deemed to be *Long-term Slight* Reversible effect at the Local scale.

8.9.1.8 Invasive Plant Species (Proposed Substation & Grid Connection)

No invasive alien plant species were recorded within or around the Proposed Substation footprint (including Grid Connection). As such, no effects are predicted in this regard.

8.9.1.9 Terrestrial Mammals (Proposed Wind Farm & TDR)

8.9.1.9.1 Badger

A total of 21 badger setts were recorded during current surveys, and the presence of an additional four setts further from the Proposed Wind Farm which were recorded during 2018 EIAR surveys is also noted.

The distances of these setts from proposed works, and potential for construction-stage effects is detailed in Table 8-30. A total of eight setts are potentially subject to direct and/or indirect effects during construction and as such will require mitigation measures. This includes two setts which would be destroyed during construction of the proposed wind farm due to proximity to a section of access track and overlap by a hard standing.

If mitigation was not put in place for setts located within 30m of works, then there would be potential for badgers to be injured by sett collapse and/or machinery as well as disturbance to badgers from noise which will be a *Short-term Significant* Reversible effect on badgers locally. Additionally, the buffer for disturbance increases to 50m (or 150m where piling is proposed) during the breeding season (July - December inclusive).

It is noted however that there are no setts within 150m of locations where piling is proposed (T8, T9 and T10).

Table 8-30: Badger setts: potential effects

Sett ID	No. Entrances	Type	Distance from Construction Activities	Potential Effect?
1	1	Subsidiary	Proposed access track (25m)	Yes
2	1	Subsidiary	Proposed access track (20m)	Yes
3	7	Main	Existing access track to form part of site access route (115m) Substation compound (250m)	No
4	3	Annex	Access track (0m) Overlapped by access track and felling buffer.	Yes
5	5	Annex	Access track (12m) Access track felling buffer (5m)	Yes
6	11	Main	Access track (158m)	No
7	2	Annex	Hard stand (overlaps sett)	Yes
8	1	Subsidiary	Hard stand (83m) Turbine felling buffer (20m)	Yes
9	2/4	Subsidiary	Hard stand (590m)	No
10	4	Main	Hard stand (623m)	No
11	3	Annex	Hard stand (607m)	No
12	1	Subsidiary	Hard stand (461m)	No
13	1	Outlier	Hard stand (252m)	No
14	1	Outlier (potential)	Turbine felling buffer (76m) Access track (89m)	No
15	5	Main	Access track (89m) Turbine felling buffer (147m)	No
16	1	Subsidiary	Access track (137m) Hard stand (186m)	No

Sett ID	No. Entrances	Type	Distance from Construction Activities	Potential Effect?
17	1	Subsidiary	Access track (101m) Hard stand (126m)	No
18	4	Annex	Access track (127m) Hard stand (155m)	No
19	15-17	Main	Access track (10m) Site compound (24m)	Yes
20	2	Subsidiary	Site compound (27m)	Yes
21	7	Annex	Site compound (38m)	Yes
A	3	Subsidiary	Proposed construction access track (447m)	No
B	2	Subsidiary or Outlier	Proposed construction access track (297m)	No
C	4	Annex	Proposed construction access route between northern and southern turbine clusters (existing local road) (173m)	No
D	2	Subsidiary	Proposed construction access route between northern and southern turbine clusters (existing local road) (240m)	No

8.9.1.9.2 Otter

Otters are present along the Fear English River, as demonstrated by the presence of one holt, one potential holt and a number of field signs (holts are located outside development boundary). Although the fisheries value and overall aquatic habitat quality are low along the Fear English where it runs through the Proposed Wind Farm, the remoteness of the area, in addition to connectivity to higher value aquatic habitats downstream and connectivity to other catchments via bog drains associated with Timahoe North Bog make the area favourable for use by otter. The use of Timahoe North Bog in addition to the river network is demonstrated by the observation of otter signs at the bog pool near T8, and also by the otter sighting at the artificial pool in the southern part of Timahoe North Bog. Otter using these pools are likely to be feeding on amphibians and large invertebrates such diving beetles.

The location of the potential holts along the Fear English River relative to proposed infrastructure and potential for effects are detailed in Table 8-31.

As per Table 8-31 below, Holt 1 (holt with potential signs of use indicated by nearby spraint) which is outside the potential zone of influence for disturbance effects to breeding otter (outside 150m buffer of infrastructure). Holt 2 (burrow with obstructing root with low potential for use as a holt) is located 142m from a turbine base, and 128m from the associated turbine hard standing, resulting in the possibility of disturbance to otter using Holt 2. However, holt 2 was observed to be inactive across multiple surveys, and to be of reduced suitability for otter due to a root restricting access. Considering the lack of evidence of otter use, in addition to the obstructing root combined with the small opening size, Holt 2 is assessed as being highly unlikely to offer suitable conditions for use as a breeding holt.

Potential effects to breeding otter outside the 150m buffer, non-breeding otter and commuting/foraging otter are considered to be *Short-term Temporary - Slight* Reversible effect at the Local scale.

Table 8-31: Otter Holts: potential effects

Holt	Distance from Construction Activities	Potential Effect?
1	Access track felling buffer (167m) Access track (160m) Turbine Hard Stand (196m) Turbine T4 (221m)	No
2	Access track felling buffer (178m) Access track (161m) Turbine Hard Stand (128m) Turbine T4 (142m)	Yes

8.9.1.9.3 Red Squirrel

Red squirrel are utilising conifer plantation (WD4) within the study area; numerous field signs for this species were recorded during previous surveys, and current surveys confirmed red squirrel are still active in the area, with a high concentration of feeding signs recorded conifer plantation in the vicinity of T6/T7. During previous surveys, a single drey was observed outside of the Proposed Wind Farm, located in conifer plantation north of T7. Dreys are used as nests to rest and for breeding (peak period January – March). No dreys were observed within the Proposed Wind Farm footprint during current or previous surveys.

It is assessed that the permanent loss of conifer plantation is unlikely to give rise to *Significant* negative effects on the local red squirrel community. This habitat type is abundant in the greater area and therefore the resultant effect on foraging red squirrel is considered near certain to be a *Long-term Slight* Reversible effect at the Local scale.

There is still however the possibility that dreys may be disturbed during felling operations. It is considered possible that any unmitigated effects on red squirrel via disturbance or destruction of dreys will be *Short-term Significant* Reversible local effect prior to mitigation.

8.9.1.9.4 Irish Hare

Irish hares were recorded utilising the improved grassland (GA1) during current surveys, and previous surveys also noted this species using the margins of woodland, particularly conifer plantation (WD4) of the study area. These habitats are managed and grazed as part of ongoing agricultural/forestry practices at the site. The habitat type is abundant in the greater area and therefore the resultant effect is considered near certain to be *Long-term Slight* Reversible effect at the Local scale.

8.9.1.9.5 Wood Mouse

Wood mice are utilising the conifer plantation (WD4) within the study area and are likely to also use the site's broadleaved woodlands, hedgerows (WL1) and treelines (WL2). These habitats are abundant in the local area. The felling of conifer plantation and removal of hedgerows/treelines will have a *Long-term Slight* Reversible effect at the Local scale.

8.9.1.9.6 Pine Marten

Pine marten have been recorded as being active across the local landscape. Previous surveys recorded activity around the conifer plantation (WD4) in the northern half of the study area, while current surveys recorded field signs along the margins of Timahoe North Bog, and captured footage of a pine martin travelling along a drainage ditch bank/treeline south of T5. However, no dens were found during the mammal surveys encompassing the footprint of the Proposed Wind Farm. Dens are normally used only during the breeding season. Pine marten use refuge sites outside these periods which are less visible and more casual. Therefore, it is assessed that the permanent loss of conifer plantation is unlikely to negatively affect the local pine marten population. Conifer plantation, expansive and varied peatlands, hedgerows and treelines are abundant in the greater area and therefore the resultant effect is considered near certain to be *Long-term Slight* Reversible effect at the Local scale.

There is a possibility that pine marten breeding or resting sites could be disturbed during felling operations. It is likely that effects to pine marten where dens or refuge sites are affected will be *Short-term Significant* Reversible effect at the Local scale prior to mitigation.

8.9.1.9.7 Irish Stoat

Irish stoat is present in the study area and would forage within habitats which are common in the local area. There is potential for Irish stoat to use the majority of the habitats within and around the Proposed Wind Farm. There is a possibility that Irish stoat breeding or resting sites could be disturbed during tree felling, or treeline, hedgerow and vegetation removal. It is considered that any unmitigated effects to Irish stoat in this category will be *Short-term Significant* Reversible effects at the Local scale prior to mitigation.

8.9.1.9.8 Hedgehog

Although not recorded during surveys, this species is likely to be present in the study area and would utilise a variety of habitats present in the local area, including the majority of the habitats within and around the Proposed Wind Farm. There is a possibility that hedgehog breeding or hibernation sites could be disturbed during tree felling, or treeline, hedgerow and vegetation removal. It is considered that any unmitigated effects on Hedgehog in this category will be *Short-term Significant* Reversible effects at the Local scale prior to mitigation.

8.9.1.9.9 Pygmy Shrew

Although not recorded during surveys, this species is likely to be present in the study area and would utilise a variety of habitats present in the local area, including the majority of the habitats within and around the Proposed Wind Farm. It is considered that any unmitigated effects on pygmy shrew would be *Short-term Imperceptible* Reversible effects at the Local scale.

8.9.1.9.10 Red Deer

Red deer were confirmed to be present during surveys. Considering they are a highly mobile and adaptable species, in addition to the presence of displacement habitats adjacent to the Proposed Wind Farm and in the wider area, any unmitigated effects on red deer would be *Short-term Imperceptible* Reversible effects at the Local scale.

8.9.1.10 Terrestrial Mammals (Proposed Substation & Grid Connection)

No setts or holts were recorded within or around the proposed substation compound and grid connection, and as such no effects in this regard are currently predicted. It is unlikely that an otter holt could occur in this area due to distance from and sub-optimal connectivity with natural watercourses. No potential effects on otter are predicted.

In the event a new sett becomes established in this area prior to construction, a *Short-term Significant* Reversible effect at the Local scale on badgers could arise during construction activities.

Similarly, if breeding or resting places of hedgehog, pine marten, Irish stoat or red squirrel were established in this area prior to construction, a *Short-term Significant* Reversible effect at the Local scale on these species could arise during construction activities.

In terms of foraging habitat loss, a *Long-term Not Significant* Reversible effect at the Local scale is predicted for badger, red squirrel, pine marten, Irish stoat, hedgehog, pygmy shrew, and wood mouse.

In terms of disturbance, a *Short-term Imperceptible* Reversible effect at the Local scale is predicted for badger, red squirrel, pine marten, Irish stoat, hedgehog, pygmy shrew, red deer, Irish hare and wood mouse.

8.9.1.10.1 Bats (Proposed Wind Farm & TDR)

The Proposed Wind Farm boundary overlaps a variety of closed wooded habitats, open agricultural habitats, peatlands habitats and linear wooded habitats. A number of small rivers also intersect and flow near the Proposed Wind Farm. Collectively, these habitats and those in the surrounding area provide suitable commuting and foraging areas for bats. The hedgerows/treelines and woodland edges provide connectivity to the wider landscape. Felling of both closed and linear wooded habitats associated with some turbine locations will alter/interrupt linear commuting routes associated with field boundaries and woodland edges.

Wooded habitats and hedgerows are widespread in the general area and this small-scale loss of habitat will not result in a negative effect on the distribution of the local bat population.

Foraging or commuting bats may suffer disturbance effects during the construction phase of the development through increased noise and lighting on the site.

However, mitigation measures including restrictions on night-time working and use of appropriate lighting will minimise or avoid these effects.

In addition to commuting and foraging features, potential roosting opportunities for bats are also present. A total of ten bat boxes was previously present in the northern part of the study area, and bats were confirmed to use these boxes (2018-2022). However, due to damage and degradation, only five of these boxes remain in place. Within these, only two boxes (4 & 5) are subject to direct effects from wind farm construction (the tree these boxes are attached to is required to be felled). Boxes 4 & 5 are currently of negligible value due to missing inspection panels leaving the boxes exposed to the elements. Two other boxes, Box 1 (moderate-high) and Box 10 (low) are not subject to direct effects but could potentially be subject to disturbance from noise. The fifth remaining box (No. 6) relates to the Proposed Substation and as such is discussed below in Section 8.9.1.10.2.

Trees with varying degrees of roosting potential are distributed across the study area. The tree PRFs identified in 2018 are still present in the same condition, with the exception of a new knothole identified on tree No.3, and tree No.11 which has fallen, lowering the PRF to an un-useable height for bats. None of these trees are subject to direct effects from the Proposed Wind Farm. A total of 16 additional trees with PRFs were identified during 2024 roost surveys of the Proposed Wind Farm. Within these, a total of nine low potential trees are within turbine felling buffers, and one low-moderate and one moderate potential trees are within turbine felling buffers. As such, prior to mitigation, there is potential for injury/disturbance to bats potentially roosting in trees or bat boxes affected by the Proposed Wind Farm footprint, and loss of potential roosting features.

A total of 12 trees with potential for occasional use by individual or low numbers of bats (negligible to low potential) were identified as being potentially subject to effects from vegetation trimming associated with the TDR.

Similarly to the bat boxes outside the project footprint, tree PRFs outside the proposed footprint could be subject to indirect effects such as noise or lighting disturbance.

The construction of proposed wind farm infrastructure and felling buffers will lead to the loss of approximately 27.68 ha or 7.5 % of habitats within the study area. A portion of this habitat loss will be reversed during the operational phase due to reinstatement of temporary compounds and recolonisation of felling buffers outside turbine/bat felling buffers.

Potential Direct Effects

- Loss or disturbance of commuting and foraging habitats (primarily woodland edges)
- Alterations to linear features may inhibit bats from crossing the landscape or result in bats using more energy by having to make longer journeys between roosts/feeding areas

Potential Indirect Effects

- Disturbance due to increased human activity as bats are very intolerant of changes to their environment
- Loss of insect prey species due to tree trimming which may reduce the amount of available food for bats

In terms of foraging/commuting/roosting habitat loss, a *Long-term Moderate* Reversible effect at the Local scale is predicted for bats prior to mitigation.

Regarding injury or disturbance, prior to mitigation, a *Short-term Significant* Reversible effect at the Local scale could occur for bats.

8.9.1.10.2 Bats (Proposed Substation & Grid Connection)

The Proposed Substation overlaps closed wooded habitats, while the grid connection traverses open agricultural habitats and linear wooded habitats. These habitats contribute to providing suitable commuting and foraging areas for bats at the landscape scale. The primary habitat loss associated with the Proposed Substation will affect mixed broadleaved/conifer woodland and conifer plantation, which are of limited suitability for foraging and commuting bats. A small area of mixed broadleaved woodland (0.22 ha or 2% of total WD1 in study area) will also be lost within the proposed substation footprint. Brown long-eared bat may occasionally forage in mixed broadleaved/conifer woodland within the proposed substation footprint; however, this species is more likely to occur in broadleaved woodland. Hedgerow connectivity will not be significantly affected due to minimal felling requirements and poor quality of affected hedgerows in terms of bat foraging/commuting suitability.

One bat box (Box No. 6) (low suitability due to damaged inspection panel, absence of surrounding vegetation and signs of occupancy by birds) is potentially subject to effects associated with construction of the grid connection (tree hosting box may need to be felled).

A total of ten moderate potential and two low potential trees are present in wooded areas surrounding the Proposed Substation. None of these trees are within the proposed infrastructure or felling footprints. While not subject to direct effects, these tree PRFs could be subject to indirect effects such as noise or lighting disturbance.

In terms of foraging/commuting/roosting habitat loss, a *Long-term Imperceptible* Reversible effect at the Local scale effect is predicted for bats.

Regarding injury or disturbance, prior to mitigation, a *Short-term Significant* Reversible effect at the Local scale could occur for bats.

8.9.1.11 Other Species (Proposed Wind Farm & TDR)

8.9.1.11.1 Common Lizard

Lizards are cryptic animals, which require both open areas for basking and also cover. Suitable habitat mosaics are present in the area in which the Proposed Wind Farm is located, and their presence has been confirmed across multiple surveys. As such, there is potential for effects due to loss of feeding and/or breeding habitat. A *Temporary Moderate* Reversible direct effect to common lizard is envisaged at the Local scale prior to mitigation.

Indirect effects to common lizard prior to mitigation due to disturbance causing temporary abandonment would result in *Temporary Imperceptible* Reversible effects at the Local scale.

8.9.1.11.2 Common Frog

There is potential for common frog to be affected directly due to loss of breeding and/or foraging habitat. The loss of 356 m of drainage ditches has been identified in the habitats impacts section. There is limited potential for frogs to deposit spawn in smaller flooded depressions which may occur in recently replanted areas, and also opportunistically within stagnant drains. Damp grassy areas in recently replanted forestry and bounding wooded and scrubby could be of occasional foraging value. As such, while considering the relatively small development footprint, the fact that a minuscule amount of potential common frog habitat is present within this, and the wide distribution of the species, a *Temporary Imperceptible* Reversible effect at the Local scale for common frog is predicted, considering both direct and indirect effects.

8.9.1.11.3 Smooth Newt

While the bog pool near T8 is assessed as sub-optimal for breeding smooth newt due to the presence of frogs and dominance of robust graminoid plants which are likely to be less favourable than smaller broadleaved plants for egg deposition, there remains some possibility that smooth newt could use this pond. Since this pond is outside the proposed wind farm footprint, no direct effects will occur. In the event that polluted runoff from construction of T8 entered the pond, there is the possibility that a *Short-term Significant* Reversible effect at the Local scale could occur for smooth newt prior to mitigation.

8.9.1.11.4 Lepidoptera

Potential effects to butterflies and moths occurring in the area are detailed in Table 8-32.

Table 8-32: Lepidoptera: Potential Effects

Species	Potential Effects	Rationale	Mitigation Required?
Nemapogon koenigi	*Short-term Slight*	Potential for slight decline in availability of larval food sources (rotting birch wood and birch polypore fungus) due to proposed felling of areas of birch-dominated non-Annex I bog woodland. Considered to be limited to a slight effect due to abundance of similar habitat outside proposed footprint, in addition to potential for felled birch logs to provide an ongoing food resource.	No
Marsh fritillary	*Short-term Significant* [Direct]	Occurs adjacent to Proposed Wind Farm; larval food plant present in locality, including one location in close proximity to proposed access track. The area of devils' bit scabious adjacent to the proposed access track is sub-optimal larval habitat and no larval webs were found in this area during surveys.	Yes
Dark Green Fritillary	*Short-term Imperceptible*	While typically associated with coastal habitats and dry calcareous grassland (Bond & Gittings, 2008), this species does appear to frequent peatland habitats in the surrounding region (NBDC, 2024). The habitats associated with peatlands in this area are highly variable, ranging from semi-natural to highly disturbed and atypical.	No

Species	Potential Effects	Rationale	Mitigation Required?
		The absence of preferred habitats and peatland habitats from the Proposed Wind Farm footprint makes the possibility of this species frequenting the Proposed site highly unlikely.	
Large Heath	None Predicted	The absence of suitable peatland habitats from the Proposed Wind Farm footprint makes the possibility of this species frequenting the Proposed site highly unlikely.	No
Small Heath	*Short-term Imperceptible*	The absence of preferred habitats from the Proposed Wind Farm footprint makes the possibility of this species frequenting the Proposed site highly unlikely.	No
Dingy Skipper	*Short-term Imperceptible*	Small areas of sub-optimal habitat may occur within the Proposed Wind Farm; higher-quality/more suitable habitats are present outside the Proposed Wind Farm in adjacent open peatland habitats.	No

8.9.1.11.5 Bees

Potential effects to bees occurring in the area are detailed in Table 8-33.

Table 8-33: Bees: Potential Effects

Species	Potential Effects	Rationale	Mitigation Required?
Barbut's Cuckoo Bee	*Short-term Moderate*	Potential for host species *Bombus hortorum* to breed along woodland edges potentially affected by Proposed Wind Farm.	Yes
Gipsy Cuckoo Bee	*Short-term Moderate*	Potential for host species *Bombus lucorum* to breed along woodland edges/clearings potentially affected by Proposed Wind Farm.	Yes
Gooden's Nomad Bee	*Temporary Imperceptible*	Habitats within Proposed Wind Farm are likely to be sub-optimal for breeding host species (*Andrena nigroaenea, A. cineraria*).	No

Species	Potential Effects	Rationale	Mitigation Required?
Large Red Tailed Bumble Bee	*Short-term Moderate*	Potential to nest in old burrows or under rocks within or near Proposed Wind Farm.	Yes
Patchwork leafcutter bee	*Temporary Slight*	Opportunistic nester, so potential to use features occurring within Proposed Wind Farm.	Yes

8.9.1.12 Other Species (Proposed Substation & Grid Connection)

8.9.1.12.1 Common Lizard

Common lizard was recorded along the proposed grid connection during surveys. As such, the same effects identified for the Proposed Wind Farm apply for the Proposed Substation, namely that a *Temporary Moderate* Reversible direct effect to common lizard at the Local scale is envisaged prior to mitigation. Indirect effects prior to mitigation due to disturbance causing temporary abandonment would result in a *Temporary Imperceptible* Reversible effect at the Local scale.

8.9.1.12.2 Common Frog

The same effects identified for the Proposed Wind Farm apply for the Proposed Substation, namely that a *Temporary Imperceptible* Reversible effect at the Local scale to common frog is predicted in terms of both direct and indirect effects.

8.9.1.12.3 Smooth Newt

There is potential for smooth newt to either forage within or traverse lands associated with the Proposed Substation. As such, a *Temporary Imperceptible* Reversible effect at the Local scale to smooth newt is predicted.

8.9.1.12.4 Butterflies

No effects to butterfly KERs are predicted to arise from construction of the Proposed Substation (including grid connection).

8.9.1.12.5 Bees

The same effects identified for the Proposed Wind Farm apply for the Proposed Substation (including grid connection), as detailed in Table 8-33.

8.9.1.13 Aquatic Ecology (Proposed Wind Farm & TDR)

Potential Direct Effects

Access tracks will be built to access proposed turbine locations where no access tracks currently exist. The proposed internal tracks will cross the Ballynamullagh Stream (EPA Name) (also known as a section of the Fear English River) at three different points (see Figure 8-9). The proposed works will also include trenching to facilitate the laying of cabling. Construction works will also be required for turbine foundations, hard standings, and the temporary compounds. Drainage channels will be created to service access roads and hard standings. Berms will be constructed from the peat excavated during construction.

There is potential for releases of suspended solids and other substances associated with upgrading, realigning and construction of access roads, turbine foundations and hard standings within the site. Excavation and earthworks associated with these activities can result in increased silt runoff. Suspended solids in even quite small quantities may have a serious effect on the spawning sites of salmonids.

Engineering works in the vicinity of streams and at stream crossings can also directly affect physical habitat, for example nursery areas for fish. Permanent loss of aquatic habitats can also occur where access roads are constructed over or in close proximity to streams/rivers. Obstruction to upstream movement of fish, particularly salmon and trout, due to construction of culverts can also potentially occur.

'Improved' drainage of the site can potentially result in increased erosion of nearby streams and may result in lower water levels in dry weather, which will reduce the habitat available to fish. Any operations which result in loss of sediment will also result in increased nutrients being released from the soil. This has the potential to cause eutrophication of streams thereby lowering the capacity of the streams to support fish and invertebrate fauna.

The construction of the wind farm is not expected to significantly affect the drainage regime on the site, with direct effects affecting watercourses and aquatic ecology minimised via the protection of water quality within the site. The site surveys also revealed that the watercourses draining this area are being affected by background water quality issues, such as agricultural practises and channel maintenance. Potential direct construction phase effects on aquatic ecology, in the absence of mitigation, are assessed as being *Short-term Slight Negative* and in the local context. Mitigation is required to avoid potential effects.

Potential Indirect Effects

The most likely potential effect during the construction phase of the development on receiving watercourses and aquatic habitats arises indirectly via effects affecting water quality, such as accidental releases of silt laden runoff. Other potential effects affecting aquatic ecology during the construction phase could also occur as a result of accidental spillage of cement or hydrocarbons stored on site affecting water quality. Waste from on-site toilets and wash facilities could also potentially effect aquatic ecology.

Indirect water quality effects can potentially occur during the construction of the proposed access roads, which cross the Ballynamullagh stream (Fear English river) at three different points. These works could result in silt run-off, pollution events originating from the site works and machinery used, which could indirectly affect areas elsewhere in the catchment. These indirect effects could give rise to potential effects on fish, as well as aquatic invertebrate communities within the catchment.

Any engineering works which cause runoff of sediments can also increase the levels of nutrients in receiving streams. This can result in the enrichment or eutrophication of the affected streams and catchment areas further downstream, and a possible change in overall water quality status. Suspended solids or sediment in a river is also a major concern and can have serious negative effects on aquatic invertebrate and instream flora. Aquatic species listed on Annex II of the EU Habitats Directive (1992) potentially occurring within the study area include the white-clawed crayfish, Atlantic salmon, brook lamprey and river lamprey. Potential effects affecting this species could occur as a result of water quality effects arising through accidental pollution events including increased erosion which may give rise to elevated suspended solids and siltation effects.

Potential for eutrophication due to contaminated run-off entering the hydrological network during tree felling and construction works exists. Deep peatlands have the potential to release ammonia once drained. While the site is located on areas of peat, the peat is minimal and disturbed. No pristine bog shall be affected as a result of the proposed development. The peat within the site is the remains of historic harvesting and the site is presently farmed and forested with associated drainage. Production of ammonia is likely to be minimal.

There is also a risk that machinery or materials imported onto the site could act as a vector for introducing or dispersing non-native invasive species. Potential indirect construction phase effects on aquatic ecology, in the absence of mitigation, are assessed as being Reversible *Short-term Slight Negative* and in the local context. Mitigation is required to avoid potential effects.

8.9.1.14 Aquatic Ecology (Proposed Substation & Grid Connection)

The proposed substation is not located near any natural watercourses, and is limited to a smaller area than the Proposed Wind Farm. A large drain is present adjacent to the proposed grid connection. The drainage network in the area in which the Proposed Substation and associated grid connection are located would drain towards the Fear English River.

Potential for direct effects is limited to the drainage channel running alongside the proposed grid connection. This is of low value in terms of aquatic ecology, and any potential direct effects are assessed as *Short-term Imperceptible* Reversible at the Local scale.

When considering indirect effects, all the same potential effects identified for the Proposed Wind Farm identified in Section 8.9.1.13 are also applicable to the Proposed Substation, and as such, indirect construction phase effects on aquatic ecology in the absence of mitigation are assessed as being Reversible *Short-term Slight* and in the local context.

Mitigation is required to avoid potential effects.

8.9.2 Operational Phase

8.9.2.1 Designated Sites (Proposed Wind Farm & TDR)

8.9.2.1.1 European Sites

A Natura Impact Statement (NIS) has been prepared for the Proposed Wind Farm. The NIS addresses potential for adverse effects on the integrity of European sites resulting from the proposed project either alone or in-combination with other projects and plans. The Stage One Appropriate Assessment Screening report concluded that, in the absence of mitigation measures (which have not been considered at screening stage), likely significant effects on the qualifying interests of the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA during the operational phase cannot be excluded on the basis of objective scientific information.

A Stage 2 Appropriate Assessment (Natura Impact Statement) of the potential effects on these two European Sites was therefore required.

The Natura Impact statement concluded that, in the light of the conclusions of the assessment which it shall conduct on the implications for the European sites concerned, the competent authority is enabled to ascertain that the proposed project will not adversely affect the integrity of any of the European sites concerned. No operational phase effects to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA were identified following mitigation.

8.9.2.1.2 Natural Heritage Areas or Proposed Natural Heritage Areas

Operational wind farms are not considered to have the potential to significantly affect the aquatic environment. The main risk to watercourses is when oils and lubricants are used on the site. The risk of substances leaked from the turbines has been eliminated by the inclusion of internal oil bunds within the design of each turbine. If substances leaked from maintenance areas in significant quantities or were disposed of inappropriately, there is the potential for water pollution. However, the likelihood of this occurring is very low and the potential significance of this effect can be mitigated through proper management. Spills of any oil or fuels from site vehicles onto the access roads may find its way to the local stream network. However, this is unlikely to be a significant effect considering the low numbers of vehicles involved and the high-quality standards that are implemented on a well-managed site.

There are 11 proposed Natural Heritage Areas (pNHAs) and four designated Natural Heritage Areas (NHAs) within 15 km of the Proposed Wind Farm, none of which are hydrologically linked to the Proposed Wind Farm. As further excavation works shall not be required during the operational phase of the proposed wind farm, only occasional maintenance works will be required (these shall be minimal without the need for large scale construction) and the use of hydrocarbons shall be minimal and the resultant risk to water quality shall be significantly less. No further effects are envisaged to these sites during the operational phase of the proposed wind farm; therefore, the effect to these sites is deemed to be a *Long-term Imperceptible Effect*.

Ballynafagh Bog pNHA (00391) is not hydrologically linked to the Proposed Wind Farm, although it has been noted that this pNHA supports breeding merlin. The potential effect to avian fauna during the operational phase of the Proposed Wind Farm is discussed in Chapter 8-2 Ornithology.

8.9.2.1.3 Coillte Biodiversity Areas

The bat felling buffers overlapping the Dunfierth Biodiversity area will be subject to periodic cutting of vegetation to keep vegetation height low and prevent the establishment of trees and shrubs during the operational phase (mechanical means only will be used to maintain the bat felling buffers; use of herbicides is not permitted). As such, these areas will be kept at an early successional stage, with low scrub, heath and grassy habitats comprising the predicted vegetation types during operation. A *Long-term Imperceptible* effect is assessed for these areas.

A *Slight* to *Moderate Short-term* Reversible indirect effect at the Local scale on the adjacent raised bog is predicted for the Dunfierth Biodiversity area. This will extend into the initial period of the operational phase (short term effects last from 1-7 years).

The felled areas and berms located outside the proposed infrastructure footprint overlapping the Kilmurry Biodiversity area will revegetate during the operational phase. No further intervention or associated effects are identified for the habitats in this area during operation.

8.9.2.2 Designated Sites (Proposed Substation & Grid Connection)

8.9.2.2.1 European Sites

No effects on European sites arising from operation of the substation and grid connection were identified.

8.9.2.2.2 Natural Heritage Areas or Proposed Natural Heritage Areas

The assessment for the Proposed Wind Farm above (Section 1.9.2.1.2) is also applicable to the Proposed Substation, excepting that no effects are predicted for merlin/Ballynafagh Bog pNHA (00391) due to operation of the Proposed Substation.

8.9.2.3 Habitats (Proposed Wind Farm & TDR)

Maintenance of the bat felling buffers around turbines will result in periodic disturbance and prevent succession when regrowth of scrub is cleared at intervals to maintain vegetation height around turbines. Based on the post-felling baseline this vegetation management will effectively be habitat alteration rather than habitat loss, and the habitats present prior to and after trimming will be of similar value (Local Importance Higher Value). A such, a *Temporary Imperceptible* Reversible direct effect at the Local scale is predicted in this regard.

There is a potential indirect effect (prior to mitigation) on water quality within the site, due to sediment erosion and runoff during the operational phase, which would be deemed to be a *Short-term Slight* Reversible effect at the Local scale until soils are re-vegetated.

Potential operational indirect effects in terms of the effects of drainage arising from proposed infrastructure are assessed as not extending beyond the *Short-term Slight to Moderate* Reversible drying out effects identified for raised bog and wet heath effect at the Local scale during construction stage (which may persist during the early stages of the operational phase).

8.9.2.4 Habitats (Proposed Substation & Grid Connection)

No further direct effects to habitats are predicted during the operational phase of the Proposed Substation (including Grid Connection).

There is a potential indirect effects (prior to mitigation) on water quality within the site, due to sediment erosion and runoff during the operational phase, which would be deemed to be *Short-term Slight* Reversible effect at the Local scale until soils are re-vegetated.

8.9.2.5 Rare Plant Species (Proposed Wind Farm & TDR)

No effects to rare plant species are predicted during the operational phase of the Proposed Wind Farm.

8.9.2.6 Rare Plant Species (Proposed Substation & Grid Connection)

No effects to rare plant species are predicted during the operational phase of the (including Grid Connection).

8.9.2.7 Invasive Plant Species (Proposed Wind Farm & TDR)

The potential for establishment of *Rhododendron ponticum* within bat felling buffers and resultant potential for further spread to be accelerated by buffer maintenance works could give rise to *Long-term Significant* Reversible effects at the Local scale prior to mitigation.

Potential spread of sycamore, butterfly bush, and snowberry due to turbine buffer maintenance works could give rise to *Long-term Slight* Reversible effect at the Local scale prior to mitigation.

8.9.2.8 Invasive Plant Species (Proposed Substation & Grid Connection)

No effects are predicted in this regard.

8.9.2.9 Terrestrial Mammals (Proposed Wind Farm & TDR)

The level of human activity associated with the maintenance of the operational windfarm will be infrequent and minimal given that it will be monitored remotely. The proposed windfarm is also located within a commercial forestry and agricultural area, so there is already disturbance caused by human and machinery activity associated with forestry and agricultural management.

Maintenance of the bat felling buffers around turbines may result in periodic disturbance to mammals.

In the event that a new badger sett was established inside or within 50m of the bat felling buffers during operation, potentially *Significant Short-term* Reversible effects at the Local scale could occur prior to mitigation.

Any negative effects to other mammals during the operational phase of the windfarm are deemed to be *Long-term Imperceptible* Reversible effect at the Local scale.

8.9.2.10 Terrestrial Mammals (Proposed Substation & Grid Connection)

Operational effects associated with the proposed Substation (including Grid Connection) are assessed as being similar to those identified for the Proposed Wind Farm, namely *Long-term Imperceptible* Reversible effects at the Local scale.

8.9.2.11 Bats (Proposed Wind Farm & TDR)

In order to undertake an assessment of the potential effects of the proposal on bats, it is important to factor in the susceptibility of the species detected during surveys to effects from wind turbines and how susceptible populations of these species are to the resultant effects in an Irish context.

SNH (2021) provides guidelines for conducting risk assessment for bat species occurring on wind farms. For collision risk of bat species to wind turbines (see Table 8-34) SNH (2021) is used.

As shown in Table 8-34, Leisler's bats and Nathusius' pipistrelles are considered at high risk of direct effects from with wind turbines, as they regularly fly in the open and at heights, which may put them at risk of collision or barotrauma from turbines. The SNH (2021) guidelines consider both common and soprano pipistrelles to be at high risk of direct effects from wind turbines; based on a study investigating bat collisions at wind farm sites across the UK (Mathews et al, 2016), which found both these species to be amongst the most commonly recorded casualties during searches of turbines. *Myotis* species, brown long-eared bats and lesser horseshoe bats are considered as low risk based on behaviour and foraging techniques of these species.

Based on population status in Ireland and risk level in relation to adverse interactions with turbines, particular attention should be paid to Leisler's bats and Nathusius' pipistrelles, which are believed to be susceptible to effects from wind turbines and have populations of high population vulnerability, in the context of wind turbine developments in Ireland. Common and soprano pipistrelles are considered to have medium population vulnerability to wind farm developments in Ireland due to behaviour in relation to turbines (SNH, 2021).

Table 8-34: Level of collision risk to individual bat species from wind turbines

Collision Risk		
Low risk	**Medium risk**	**High risk**
Myotis species Brown long-eared bat Lesser horseshoe bat	-	Leisler's bat Nathusius' pipistrelle Common pipistrelle Soprano pipistrelle

With the exception of Nathusius' pipistrelle (and whiskered bat if present), the bat species recorded utilising the wind farm site are generally considered common and widespread in an Irish context (Marnell et al., 2019 & Roche et al., 2014). Taking into account the EU Annex IV protected status of bats, the bat assemblage is considered to represent a feature of *Regional* Importance.

Site Risk Assessment

Using the SNH guidelines outlined in Table 8-35, the following risk assessment for the individual turbines in relation to each bat species recorded was completed using the following values:

- Project Size = **Medium** (>10 turbines, other wind energy developments within 10km)
- Habitat Risk = **High** (suitable buildings, trees or other structures with moderate-high roost potential near the site; confirmed roosts close to the site; extensive and diverse habitat mosaic of high quality for foraging bats; site is connected to the wider landscape by a network of strong linear features including rivers, mature hedgerows and woodland edges; proximity to commuting routes)

Therefore, a Site Risk Assessment score value of **4** was applied to the Site as a whole.

Table 8-35: Stage 1 - Initial site risk assessment (SNH, 2021)

Site Risk Level (1-5)*	Project Size		
	Small	**Medium**	**Large**
Habitat Risk			
Low	1	2	3
Moderate	2	3	4
High	3	4	5

Key: Green (1-2) - low/lowest site risk; Amber (3) - medium site risk; Red (4-5) - high/highest site risk.

* Some sites could conceivably be assessed as being of no (0) risk to bats. This assessment is only likely to be valid in more extreme environments, such as above the known altitudinal range of bats, or outside the known geographical distribution of any resident British species.

Habitat Risk	Description
Low	Small number of potential roost features, of low quality. Low quality foraging habitat that could be used by small numbers of foraging bats. Isolated site not connected to the wider landscape by prominent linear features.
Moderate	Buildings, trees or other structures with moderate-high potential as roost sites on or near the site. Habitat could be used extensively by foraging bats. Site is connected to the wider landscape by linear features such as scrub, tree lines and streams.
High	Numerous suitable buildings, trees (particularly mature ancient woodland) or other structures with moderate-high potential as roost sites on or near the site, and/or confirmed roosts present close to or on the site. Extensive and diverse habitat mosaic of high quality for foraging bats. Site is connected to the wider landscape by a network of strong linear features such as rivers, blocks of woodland and mature hedgerows. At/near edge of range and/or on an important flyway. Close to key roost and/or swarming site.

Project Size	Description
Small	Small scale development (≤10 turbines). No other wind energy developments within 10km. Comprising turbines <50m in height.
Medium	Larger developments (between 10 and 40 turbines). May have some other wind developments within 5km. Comprising turbines 50-100m in height.
Large	Largest developments (>40 turbines) with other wind energy developments within 5km. Comprising turbines >100m in height.

Impact Assessment

The Impact assessment is determined by multiplying the Site Risk Assessment value (4 as outlined above) by the Ecobat median percentile (most frequent activity category) activity values for each turbine, converted to the activity score as shown in Table 8-37. See Table 8-36 for conversion of median percentiles to Ecobat activity levels (there are five Ecobat activity levels across the median percentile range of 0 -100).

Table 8-36: Percentile Score and Categorised Level of Bat Activity

Percentile	Bat Activity
81 to 100	High
61 to 80	Moderate to High
41 to 60	Moderate
21 to 40	Low to Moderate
0 to 20	Low

The median percentile activity levels for each of the High Risk (leisler, common pipistrelle, soprano pipistrelle and nathusius' pipistrelle) were averaged across each survey season and converted to the corresponding Ecobat activity category for use in the risk assessment matrix (Table 8-37).

The Impact Assessment is then carried out for the individual turbines using the overall site assessment value (4) and compared to the Risk Assessment Matrix (Table 8-37) in order to determine the level of overall risk to the population.

It should be noted that the Impact Assessment is based on the median values to determine overall risk to population.

Table 8-37: Risk Assessment Matrix

	Ecobat activity percentile category					
Site Risk	**Nil (0)**	**Low (1)**	**Low – Moderate (2)**	**Moderate (3)**	**Moderate – High (4)**	**High (5)**
Lowest (1)	0	1	2	3	4	5
Low (2)	0	2	4	6	8	10
Medium (3)	0	3	6	9	12	15
High (4)	0	4	8	12	15	18
Highest (5)	0	5	10	15	20	25

Overall assessment value (i.e. Turbine Risk value) is then compared to the ranges below:

Low Overall Risk (0-4)	Medium Overall Risk (5-12)	High Overall Risk (13-25)

8.9.2.11.1 Ecobat 2023

For the 2023 survey season, a total of ten turbine locations have a low overall risk (T1-2 and T4-T11), and one turbine location (T3) is of medium overall risk in relation to Ecobat median values with regards to Leisler's bat. This is presented in Table 8-38.

Table 8-38: Risk assessment for each turbine location - Leisler's bat

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
1	T1	4	1	4
2	T2	4	1	4
3	T3	4	2	8
4	T4	4	1	4
5	T5	4	1	4
6	T6	4	1	4

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
7	T7	4	1	4
8	T8	4	1	4
9	T9	4	1	4
10	T10	4	1	4
11	T11	4	1	4

For the 2023 survey season, all 11 turbine locations have a low overall risk in relation to Ecobat median values with regards to common pipistrelle. This is presented in Table 8-39.

Table 8-39: Risk assessment for each turbine location - common pipistrelle

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
1	T1	4	1	4
2	T2	4	1	4
3	T3	4	1	4
4	T4	4	1	4
5	T5	4	1	4
6	T6	4	1	4
7	T7	4	1	4
8	T8	4	1	4
9	T9	4	1	4
10	T10	4	1	4
11	T11	4	1	4

For the 2023 survey season, all 11 turbine locations also have a low overall risk in relation to Ecobat median values with regards to soprano pipistrelle. This is presented in Table 8-40.

Table 8-40: Risk assessment for each turbine location - soprano pipistrelle

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
1	T1	4	1	4
2	T2	4	1	4
3	T3	4	1	4
4	T4	4	1	4
5	T5	4	1	4
6	T6	4	1	4
7	T7	4	1	4
8	T8	4	1	4
9	T9	4	1	4
10	T10	4	1	4
11	T11	4	1	4

For the 2023 survey season, Nathusius' pipistrelle was not recorded consistently enough to calculate an average median percentile value. It was not recorded at T5, T6, T8, T9 and T10. All instances where it was recorded where at levels equivalent to activity category 1 i.e. low activity.

As such, it can be assessed that activity category 1 applies to all turbine locations where this species was recorded.

Table 8-41: Risk assessment for each turbine location - Nathusius' pipistrelle

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
1	T1	4	1	4
2	T2	4	1	4
3	T3	4	1	4
4	T4	4	1	4
5	T5	4	Species Not Recorded	N/A
6	T6	4	Species Not Recorded	N/A

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
7	T7	4	1	4
8	T8	4	Species Not Recorded	N/A
9	T9	4	Species Not Recorded	N/A
10	T10	4	Species Not Recorded	N/A
11	T11	4	1	4

For the 2023 survey season, activity levels for the genus-level grouping *Pipistrellus* Spp. were assigned across all survey periods at T1-T7 and T11; as such the Ecobat median category is based on average values across all survey periods for these turbines. For T9 and T10, no activity was assigned to this group during survey period 2 and as such the Ecobat median category for these turbines is based on an average values across survey periods 1 and 2. Activity was only assigned to this genus-level grouping at T8 during survey period 2, and as such the median value for that period alone is used to calculate the Ecobat median category.

Turbines T7 and T10 have a low overall risk in relation to Ecobat median values with regards to pipistrelle species. Turbines T1-T6, T8, T9 and T11 have a medium overall risk in relation to Ecobat median values with regards to pipistrelle species. This is presented in Table 8-42.

Table 8-42: Risk assessment for each turbine location - pipistrelle species

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
1	T1	4	2	8
2	T2	4	2	8
3	T3	4	2	8
4	T4	4	2	8
5	T5	4	2	8
6	T6	4	2	8
7	T7	4	1	4
8	T8	4	2	8
9	T9	4	3	12
10	T10	4	1	4

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
11	T11	4	2	8

8.9.2.11.2 Ecobat 2022

It should be noted that turbine locations were not finalised during the 2022 survey season and as such there were no detectors covering the locations of T2, T7 and T10 for this period.

For the 2022 survey season, a total of eight turbine locations have a low overall risk (T1, T3, T4, T5, T6, T8, T9 and T11) in relation to Ecobat median values with regards to Leisler's bat. There were two detectors deployed approximately equidistant from T6 (Dr07 and Dr08). This is presented in Table 8-43.

Table 8-43: Risk assessment for each turbine location - Leisler's bat

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
1	Dr01	4	1	4
2	Not Covered	4	N/A	N/A
3	Dr02	4	1	4
4	Dr05	4	1	4
5	Dr06	4	1	4
6	Dr07	4	1	4
6	Dr08	4	1	4
7	Not Covered	4	N/A	N/A
8	Dr09	4	1	4
9	Dr10	4	1	4
10	Not Covered	4	N/A	N/A
11	Dr12	4	1	4

For the 2022 survey season, all turbine locations covered by the static detector survey have a low overall risk in relation to Ecobat median values with regards to common pipistrelle. This is presented in Table 8-44.

Table 8-44: Risk assessment for each turbine location - common pipistrelle

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
1	Dr01	4	1	4
2	Not Covered	4	N/A	N/A
3	Dr02	4	1	4
4	Dr05	4	1	4
5	Dr06	4	1	4
6	Dr07	4	1	4
6	Dr08	4	1	4
7	Not Covered	4	N/A	N/A
8	Dr09	4	1	4
9	Dr10	4	1	4
10	Not Covered	4	N/A	N/A
11	Dr12	4	1	4

For the 2022 survey season, seven of the turbine locations (T1, T3, T4, T5, T8, T9 and T11) covered by the 2022 static detector survey have a low overall risk in relation to Ecobat median values with regards to soprano pipistrelle. T6 has a medium overall risk for this species, based on the higher risk level assessed for Dr08. This is presented in Table 8-45.

Table 8-45: Risk assessment for each turbine location - soprano pipistrelle

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
1	Dr01	4	1	4
2	Not Covered	4	N/A	N/A
3	Dr02	4	1	4
4	Dr05	4	1	4
5	Dr06	4	1	4
6	Dr07	4	1	4
6	Dr08	4	2	8

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
7	Not Covered	4	N/A	N/A
8	Dr09	4	1	4
9	Dr10	4	1	4
10	Not Covered	4	N/A	N/A
11	Dr12	4	1	4

For the 2022 survey season, Nathusius' pipistrelle was recorded at Dr02, Dr07 and Dr09 for two survey periods and as such the average Ecobat median category for those detectors is calculated on calculated based on two survey rounds. At Dr01, this species was only recorded during survey period 1 (2022) and as such the Ecobat median percentile for this period alone was used to calculate the Turbine risk for Nathusius' pipistrelle at this location (Dr01/T1). For all other locations covered by detectors during the 2022 survey season, Nathusius' pipistrelle was recorded during all three survey periods and as such the Ecobat median percentiles for these locations were averaged to calculate turbine risk.

Locations T1, T3 and T6 (T6 based on higher median percentile assessed for Dr08) had a medium overall risk for this species, while T4, T5, T8, T9 and T11 were low risk. This is presented in Table 8-46.

Table 8-46: Risk assessment for each turbine location - Nathusius' pipistrelle

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
1	Dr01	4	2	8
2	Not Covered	4	N/A	N/A
3	Dr02	4	2	8
4	Dr05	4	1	4
5	Dr06	4	1	4
6	Dr07	4	1	4
6	Dr08	4	2	8
7	Not Covered	4	N/A	N/A
8	Dr09	4	1	4
9	Dr10	4	1	4
10	Not Covered	4	N/A	N/A

Turbine No.	Detector No.	Site risk value	Ecobat median category	Turbine risk (site risk x Ecobat median category)
11	Dr12	4	1	4

Table 8-47: Summary of bat survey data and assessments

https://uss.ftco.ie/DMS/view_document.aspx?ID=1135491&Latest=true

Survey Season	Turbine No.	Risk Assessment Leisler' s bat	Risk Assessment Common pipistrelle	Risk Assessment Soprano pipistrelle	Risk Assessment Nathusius' pipistrelle	Risk Assessment '*Pipistrellus* Spp.	Clarifying comment	Bat Habitat within 200m	Bat Habitat along wind farm access tracks	Bat encounters wind farm access tracks	If no mitigation is applied, what is the potential impact level?
	As indicated in this report	Turbine risk (site risk x Ecobat median category)	Turbine risk (site risk x Ecobat median category)	Turbine risk (site risk x Ecobat median category)	Turbine risk (site risk x Ecobat median category)	Turbine risk (site risk x Ecobat median category)	Is location of Static at Turbine location (final layout)? Yes/No			In vicinity of Turbine location	Taking into consideration the clarifying comment.
2023	1	4	4	4	4	8	No (72m)	Yes	Yes	Yes	Low-Moderate
	2	4	4	4	4	8	No (47m)	Yes	Yes	Yes	Low-Moderate
	3	8	4	4	4	8	No (88m)	Yes	Yes	Yes	Low-Moderate
	4	4	4	4	4	8	No (31m)	Yes	Yes	No	Low-Moderate
	5	4	4	4	N/A	8	No (14m)	Yes	Yes	Yes	Low-Moderate
	6	4	4	4	N/A	8	No (14m)	Yes	Yes	No	Low-Moderate
	7	4	4	4	4	4	No (16m)	Yes	Yes	No	Low

Survey Season	Turbine No.	Risk Assessment Leisler's bat	Risk Assessment Common pipistrelle	Risk Assessment Soprano pipistrelle	Risk Assessment Nathusius' pipistrelle	Risk Assessment *'Pipistrellus* Spp.	Clarifying comment	Bat Habitat within 200m	Bat Habitat along wind farm access tracks	Bat encounters wind farm access tracks	If no mitigation is applied, what is the potential impact level?
	As indicated in this report	Turbine risk (site risk x Ecobat median category)	Turbine risk (site risk x Ecobat median category)	Turbine risk (site risk x Ecobat median category)	Turbine risk (site risk x Ecobat median category)	Turbine risk (site risk x Ecobat median category)	Is location of Static at Turbine location (final layout)? Yes/No			In vicinity of Turbine location	Taking into consideration the clarifying comment.
	8	4	4	4	N/A	8	No (23m)	Yes	Yes	No	Low-Moderate
	9	4	4	4	N/A	12	No (86m)	Yes	Yes	Yes	Low-Moderate
	10	4	4	4	N/A	4	No (182m)	Yes	Yes	No	Low
	11	4	4	4	4	8	Yes (1m)	Yes	Yes	Yes	Low-Moderate
2022	1	4	4	4	8	N/A	No (8m)	Yes	Yes	Yes	Low-Moderate
	2	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Yes	Yes	N/A
	3	4	4	4	8	N/A	No (214m)	Yes	Yes	Yes	Low-Moderate
	4	4	4	4	4	N/A	No (235m)	Yes	Yes	Yes	Low

Survey Season	Turbine No.	Risk Assessment Leisler's bat	Risk Assessment Common pipistrelle	Risk Assessment Soprano pipistrelle	Risk Assessment Nathusius' pipistrelle	Risk Assessment *'Pipistrellus* Spp.	Clarifying comment	Bat Habitat within 200m	Bat Habitat along wind farm access tracks	Bat encounters wind farm access tracks	If no mitigation is applied, what is the potential impact level?
	As indicated in this report	Turbine risk (site risk x Ecobat median category)	Turbine risk (site risk x Ecobat median category)	Turbine risk (site risk x Ecobat median category)	Turbine risk (site risk x Ecobat median category)	Turbine risk (site risk x Ecobat median category)	Is location of Static at Turbine location (final layout)? Yes/No			In vicinity of Turbine location	Taking into consideration the clarifying comment.
	5	8	4	4	4	N/A	No (156m)	Yes	Yes	No	Low
	6	8	4	8	8	N/A	No (80m)	Yes	Yes	Yes	Low-Moderate
	7	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Yes	Yes	N/A
	8	4	4	4	4	N/A	No (279m)	Yes	Yes	No	Low
	9	4	4	4	4	N/A	No (87m)	Yes	Yes	Yes	Low
	10	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Yes	No	N/A
	11	4	4	4	4	N/A	No (30m)	Yes	Yes	Yes	Low

8.9.2.11.3 Potential Operational effects (Bats)

Both direct collision with rotor blades and barotrauma (injuries to internal air cavities and blood vessels caused by sudden change in air pressure behind a moving blade), have been found to directly effect bats (e.g. Cryan & Barclay, 2009, Rydell et al., 2010, Cryan et al. 2014, & Mathews et al., 2016). The evaluation of Irish bat species likely to be at risk from collision and barotrauma is detailed in Table 8-34 and is in part related to the likelihood of different species flying at rotor blade height in an open landscape. It is noted that common pipistrelles have been demonstrated to be attracted to wind turbines and occur around wind turbines at higher levels than at control locations nearby (Richardson et al 2021).

The SNH et al. (2021) guidance incorporates the 50m set-back distance between the rotor swept area and habitat features (such as forestry edge and treelines/ hedgerows). However, this guidance mainly applies to species such as common and soprano pipistrelles, which are known to follow linear habitat features when foraging or commuting. It is not relevant to areas where linear features are absent or sites where Leisler's bat activity is high, since this species is just as likely to fly over open terrain as along habitat features.

The potential operational effects of the Proposed Wind Farm on bat populations in the area need to be considered in the context of proposed mitigation measures for bats. Mitigation will include minimum separation distances from likely (foraging and commuting) features of 50 m to the rotor swept areas for all turbines (and for all proposed combinations of turbine dimensions). This necessitates a requirement for vegetation clearance; and then re-planting linear habitats to compensate for the habitat loss and ensure integrity of the wider area for foraging and commuting bats.

Recorded activity and Ecobat assessment across 2022 and 2023 survey data indicate low-moderate activity levels for Leisler's bat, soprano pipistrelle, Nathusius' pipistrelle for at least one turbine location and *Pipistrellus* Spp. at nine locations. Based on this, a *Long-term Moderate* Reversible effect at the *County* level is assessed for Leisler's bat, common pipistrelle, soprano pipistrelle and Nathusius' pipistrelle prior to mitigation.

Given the low collision risk and low recorded activity levels for *Myotis* species and brown long-eared bat prior to mitigation, the potential direct effects of the operational phase upon *Myotis* species and brown long-eared bat are considered to be *Long-term Not Significant* and Reversible at the Local level.

8.9.2.12 Bats (Proposed Substation & Grid Connection)

No direct or indirect effects on bats are predicted to arise from operation of the Proposed Substation (including grid connection).

8.9.2.13 Other Species (Proposed Wind Farm & TDR)

8.9.2.13.1 Common Lizard

Maintenance of the bat felling buffers around turbines may result in periodic disturbance to common lizard. In the event of disturbance to breeding lizards, a *Temporary Moderate* Reversible effect at the Local scale (direct and/or indirect) to common lizard could occur prior to mitigation.

8.9.2.13.2 Common Frog

Prior to mitigation, there is potential for effects on water quality within the site due to potential localised water pollution during the operational phase which could have a negative indirect effects on breeding common frog. The potential effects on frogs prior to mitigation is a *Temporary Slight* Reversible effect at the Local scale prior to mitigation.

8.9.2.13.3 Smooth Newt

Maintenance of the bat felling buffers around turbines could potentially result in disturbance to smooth newt traversing the site; similarly to common frog, there is potential for effects on water quality within the site due to potential localised water pollution during the operational phase which could have a negative indirect effects on breeding smooth newt. A *Temporary Slight* Reversible direct effect at the Local scale is predicted in this regard prior to mitigation.

8.9.2.13.4 Butterflies

There is potential for the local marsh fritillary population to expand into the turbine felling buffers in the event that suitable habitat including the larval food plant devil's bit scabious established in these areas due to operational vegetation management measures, giving rise to potential for *Short-term Significant* Reversible effects at the Local scale prior to mitigation. Potential effects to other butterflies during the operational phase of the Proposed Wind Farm are assessed as *Short-term Not significant* to *Slight* Reversible Effects at the local scale.

8.9.2.13.5 Bees

Maintenance of the bat felling buffers around turbines could potentially result in disturbance breeding Barbut's cuckoo bee, gipsy cuckoo bee, Gooden's nomad bee, large red tailed bumble bee and patchwork leafcutter bee. A *Temporary Moderate* Reversible direct effect at the Local scale prior to mitigation is predicted in this regard.

8.9.2.14 Other Species (Proposed Substation & Grid Connection)

No effects to common lizard, smooth newt, butterflies or bees are predicted during the operational phase of the Proposed Substation (including Grid Connection).

Prior to mitigation, there is potential for effects on water quality within the site due to potential localised water pollution during the operational phase which could have a negative indirect effect on breeding common frog. The potential (indirect) effects on frogs prior to mitigation is *Temporary Slight* Reversible at the Local scale.

8.9.2.15 Aquatic Ecology (Proposed Wind Farm & TDR)

Operational wind farms are not normally considered to have the potential to significantly affect the aquatic environment. The main risk to watercourses is when oils and lubricants are used on the site. If such substances leaked from the turbines or maintenance areas or were disposed of inappropriately, there is a risk of water pollution. However, the likelihood of this occurring is very low, and the potential significance of this effect can be mitigated through proper management. Spills of any oil or fuels from site vehicles onto the access roads may find their way to the local stream network.

However, this is unlikely to be a significant effect considering the low numbers of vehicles involved and the high quality standards that are implemented on a well-managed site.

Potential operational phase effects on aquatic ecology are assessed as being *Imperceptible Temporary* Reversible and in the local context.

8.9.2.16 Aquatic Ecology (Proposed Substation & Grid Connection)

The same potential effects identified for the Proposed Wind Farm identified in Section 1.9.2.14 above are also applicable to the Proposed Substation (including Grid Connection), and as such, indirect construction phase effects on aquatic ecology in the absence of mitigation are assessed as being *Short-term Slight* Reversible and in the local context.

8.9.3 Decommissioning Phase

Decommissioning activities of the Drehid Wind Farm Project will take place in a similar fashion to the construction phase. Potential effects will be similar to the construction phase but on a reduced scale.

8.9.3.1 European Sites (Proposed Wind Farm & TDR)

A Natura Impact Statement (NIS) has been prepared for the Proposed Wind Farm. The Stage One Appropriate Assessment Screening report concluded that, in the absence of mitigation measures (which have not been considered at this screening stage), likely significant effects on the qualifying interests of the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA at decommissioning stage cannot be excluded on the basis of objective scientific information. A Stage 2 Appropriate Assessment (Natura Impact Statement) of the potential impact on the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA was therefore required.

The Natura Impact statement concluded that, the competent authority is enabled to ascertain that the proposed project will not adversely affect the integrity of any of the European sites concerned. No decommissioning phase effects to the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA were identified following mitigation.

8.9.3.2 Natural Heritage or Proposed Natural Heritage Areas (Proposed Wind Farm & TDR)

No construction or operational stage effects were identified for any pNHAs or NHAs. As such, no decommissioning effects will in this category are predicted.

8.9.3.3 European Sites (Proposed Substation & Grid Connection)

The same assessment detailed for the Proposed Wind Farm in Section 8.9.3.1 is also applicable to the Proposed Substation (including Grid Connection).

8.9.3.4 Natural Heritage or Proposed Natural Heritage Areas (Proposed Substation & Grid Connection)

No construction or operational stage effects were identified for any pNHAs or NHAs. As such, no decommissioning effects will in this category are predicted.

8.9.3.5 Habitats and Flora (Proposed Wind Farm & TDR)

The decommissioning of the wind farm may result in some temporary loss of habitat, primarily to hedgerows at access points which may require partial removal to facilitate the removal of turbine parts. In addition it is likely that disturbance to habitats which established during the operational phase will arise from the relocation of topsoil from landscaping features/earthworks to cover turbine foundations and hard standings.

Vegetation clearance and topsoil movement would result in a *Short-term Not Significant* Reversible Effect at the Local scale.

There is a potential indirect effect (prior to mitigation) on water quality due to potential sediment erosion and runoff during decommissioning, which is assessed as a *Short-term Slight* Reversible effect at the Local scale.

No effects to rare plant species are predicted during decommissioning of the Proposed Wind Farm.

8.9.3.6 Habitats and Flora (Proposed Substation & Grid Connection)

The Proposed Substation (including Grid Connection) will be left in situ for continued use as part of the national electricity grid.

8.9.3.7 Invasive Plant Species (Proposed Wind Farm & TDR)

The potential for establishment of *Rhododendron ponticum* within the Proposed Wind Farm and potential for further spread to be accelerated by decommissioning works could give rise to *Long-term Significant* Reversible effect at the Local scale prior to mitigation.

Potential spread of sycamore, butterfly bush, and snowberry due to decommissioning works could give rise to *Long-term Slight* Reversible effect at the Local scale prior to mitigation.

8.9.3.8 Invasive Plant Species (Proposed Substation & Grid Connection)

No effects are predicted in this regard.

8.9.3.9 Terrestrial Mammals (Proposed Wind Farm & TDR)

Vehicular traffic during decommissioning along access roads may result in fatalities; however, this is not expected to be significant due to the mainly diurnal requirement for access and speed restrictions which will be in place. Direct effects on badger during the decommissioning process could occur if setts have become established in locations to be affected. Potential direct effects to badgers in the event of setts becoming established within areas which will be directly affected are *Significant, Short-term*, Local and Reversible prior to mitigation.

The potential exists for indirect effects via both visual and noise disturbance, in particular decommissioning works overlapping with periods of activity by badger. Badgers may also be excluded from foraging areas due to screening/fencing erected during works. Indirect effects could occur if setts have become established in locations to be affected. Potential indirect effects are *Moderate-Significant*, Short-term, Local and Reversible prior to mitigation.

8.9.3.9.1 Otter

Sediment and/or contaminated run-off entering streams and waterways could reduce water quality within areas where prey items occur, an increase in sediment could also lead to the smothering of spawning grounds if present thereby inducing longer term effects on prey availability; however, this will be minimal during the decommissioning process. Potential indirect effects are *Moderate, Temporary*, Local and Reversible prior to mitigation.

8.9.3.10 Terrestrial Mammals (Proposed Substation & Grid Connection)

The Proposed Substation (including Grid Connection) will be left in situ for continued use as part of the national electricity grid.

8.9.3.11 Bats (Proposed Wind Farm & TDR)

The possible direct effects on bats during the decommissioning phase of the wind farm are greatly reduced compared with the construction phase of the project; works will be limited to turbine removal, and reinstatement of hard standings, resulting in potential disturbance only.

Indirect effects through limited hedgerow removal for access could occur, however and any sections removed will be short and will not sever foraging or commuting routes.

As such, potential effects due to decommissioning will be limited to:

- Disturbance due to increased human activity.
- Trimming of vegetation and/or limited hedgerow removal to accommodate turbine removal.

Potential effects are *Slight, Short-term*, *Local* and Reversible prior to mitigation.

8.9.3.12 Bats (Proposed Substation & Grid Connection)

The Proposed Substation (including Grid Connection) will be left in situ for continued use as part of the national electricity grid.

8.9.3.13 Other Species (Proposed Wind Farm & TDR)

Effects on other species will be similar to the construction phase but reduced.

8.9.3.14 Other Species (Proposed Substation & Grid Connection)

The Proposed Substation (including Grid Connection) will be left in situ for continued use as part of the national electricity grid.

8.9.3.15 Aquatic Ecology (Proposed Wind Farm & TDR)

The decommissioning phase of the Proposed Wind Farm gives rise to potential effects similar to those which could be realised during the construction phase; although the magnitude of the effects of decommissioning is normally reduced as all infrastructure is already in place on the site. With suitable planning and provision of adequate mitigation potential effects on the receiving aquatic environment during decommissioning can be minimised. Potential decommissioning effects on aquatic ecology, in the absence of mitigation, are assessed as being *Short-term Slight* Reversible and in the local context.

8.9.3.16 Aquatic Ecology (Proposed Substation & Grid Connection)

The Proposed Substation (including Grid Connection) will be left in situ for continued use as part of the national electricity grid.

8.9.4 Potential Cumulative Effects

8.9.4.1 Overview of Cumulative Effect Sources

The planning search encompassed a search for wind farm developments within 25 km, and a search for solar farm and other large-scale developments within 5 km. The results of these searches are summarised in Table 8-48 to Table 8-50. The ongoing forestry management applicable to the northern part of Proposed Development is also considered.

8.9.4.1.1 Wind Farm Developments

Cushaling Wind Farm is currently under construction and when complete will comprise a 9-turbine wind farm; it is located 10.2 km southwest of the Proposed Development. The 21- turbine operational Cloncreen Wind Farm is located 15.2 km southwest of the Development. Mount Lucas wind farm, located c. 22.7 km southwest of the Proposed Development.

The Yellow River wind farm located north of Rhode Co Offaly is a 29-turbine wind farm (17.4 km north-west of Development) is operational. The consented Ballivor Wind Farm is located 17.3 km north-west of the Proposed Development and comprises 26 turbines. Both of these wind farms are located within the same catchment (River Boyne) as the Proposed Wind Farm, with drainage from Yellow River, Ballivor and the Proposed Development site ultimately draining to the River Boyne.

While Yellow River wind farm, Ballivor wind farm and the Proposed Development are all located in the Boyne catchment, the in-stream distance between these projects and the section of the Boyne where the downstream flows from these project locations converge is such that any potential cumulative effects on water quality are assessed as **Short-term Imperceptible**. In addition, it is unlikely that the construction phases for these wind farms will overlap with construction of the proposed development.

There is potential for cumulative effects arising from these wind farm developments from to occur at construction, operational and decommissioning stages. The particular effects applicable to each receptor are detailed in Sections 8.9.4.2 to 8.9.4.4.

Table 8-48: Wind Farm Developments within 25 km of the Proposed Development

Development	Distance/Direction	Catchment	(No. of Turbines)	Current Status
Cushaling Wind Farm	10.2 km South-west	Barrow	9	Under Construction
Cloncreen Wind Farm	15.2 km South-west	Barrow	21	Operational
Yellow River Wind Farm	17.4 km North-west	Boyne	29	Operational
Ballivor Wind Farm	17.3 km North-west	Boyne	26	Consented
Mount Lucas Wind Farm	22.7 km South-west	Barrow	28	Operational

8.9.4.1.2 Solar Developments

A number of solar farm developments are located within 5 km. These include projects which are operational, under construction, consented and in planning. All of these developments are located within the same catchment (River Boyne) as the Proposed Development. There is potential for cumulative effects arising from these wind/solar farm developments from to occur at construction, operational and decommissioning stages. The particular effects applicable to each receptor are detailed in Sections 8.9.4.2 to 8.9.4.4.

Table 8-49: Solar Farm Developments within 5 km of the Proposed Development

Development	Distance/Direction	Catchment	Development Site Size (ha)	Current Status
Mulgeeth Solar Farm	95m East of T10	Boyne	81 ha	Refused Feb. 2025 - may be appealed
Timahoe North Solar Farm	220m South-east of T3	Boyne	200 ha	Operational
Dysart Solar Farm	2.5 km	Boyne	35 ha	Consented

Development	Distance/Direction	Catchment	Development Site Size (ha)	Current Status
	North-east			
Coolcarrigan Solar Farm	3.7 km South-east	Boyne	114 ha	Consented
Hortland Solar Farm	3.9 km East	Boyne	31 ha	Operational

8.9.4.1.3 Other Large-Scale Developments

There are a number of significant developments in the vicinity of the Development including a number of large housing developments, mixed use developments, landscaping developments and the extension of the existing Drehid Landfill. Details of these cumulative developments are presented in Table 8-50.

Potential cumulative effects arising from these developments are most likely to be applicable to the construction phase, in the event of any of these developments being constructed concurrently with the Proposed Development. There is also potential for operational and decommissioning phase cumulative effects in this category, although they are predicted to be of much lower magnitude than potential construction stage cumulative effects. The particular effects applicable to each receptor are detailed in Sections 1.9.4.2 to 1.9.4.4.

Table 8-50: Other Developments within 5 km

Development	Direction from Proposed Development	Proposed Development site (km)	Status
A number of residential developments	North	2.8 km	Granted consent
There are a number of consented large residential developments in Enfield which have been integrated into one large project. The planning references are Meath Co. Co. Reg Ref. 21/1449, 21/1461, 21/1462, 23/272. The consents include 99 residential units (21/1449), 67 residential units (21/1461) 77 residential units (21/1462) and a further 77 residential units (23/272); all with ancilliary infrastructure such as public open space, car parking, bicycle parking etc.			
Johnstown Estate Renovations	North	2 km	Granted consent
Kildare planning reference 23/613. The proposed works are principally to the existing banquet hall and conference centre located to the south of the main hotel building and associated external landscaped areas. The proposed external works comprise: (i) the provision of a new 210 sq.m. store room extension; (ii) a 136 sq.m. extension to the south east corner of the building to provide a new glazed orangery bar; (iii) demolition of existing single storey draught lobby (30 sq.m.) and construction of a new 60 sq.m. extension (4.050m in height) on the northern side of the building to provide for a bar area (44 sq.m.) and 2 no. store rooms (8sq.m. each); (iv) a new 20 sq.m. entrance lobby with an external canopy to the southern side of the building; (v) 2 no. new external seating areas to the east and west of the proposed entrance lobby; (vi) a new vehicular circulation layout with roundabout and water feature to the front of the proposed entrance lobby, loading bay, access ramp, external stair case, footpaths; (vii) relocation of the approved bike store located in the service yard (Reg. Ref. 22/1089) underneath proposed store building; and, (viii) the provision of a landscaped seating deck to the			

Development	Direction from Proposed Development	Proposed Development site (km)	Status
south of the building. Proposed internal works comprise reconfiguration of existing conference and banqueting accommodation to provide (a) 2 no. conference banqueting suites (320sq.m. and 280 sq.m.), (b) 2 no. meeting rooms (180 sq.m. and 110 sq.m.). (c) reception lobby (135 sq.m.) and (d) associated toilets, storage, cloakrooms and staff areas. Retention permission is sought for 4 no. accessible car parking spaces provided to the front of the hotel (southwest facade) and existing landscaping works comprising an existing timber pergola structure to south of the hotel development. The development also includes all other associated engineering works, landscaping, and ancillary works necessary to facilitate the development.			
Restoration of 5 ha of agricultural land	North	3.2 km	Granted Consent
Meath planning reference TA200121. The development comprises: a) use of existing stockpiles for site restoration (b) importation of inert excavation spoil comprising natural materials of clay, silt, sand, gravel or stone for the purposes of restoration of a previously extracted area (QY/54) to restore the site to a beneficial agricultural and ecological afteruse (5.85 hectares) (c) Temporary Portacabin Offices and Staff Facilities 100sqm. (d) Wheel Wash and weighbridge 134m2 (e) Site entrance and access road (f) Lockable access gate at the pit entrance (g) All other ancillary buildings, plant and facilities for the restoration, and all ancillary site works. The application is accompanied by an Environmental Impact Statement (Environmental Impact Assessment Report) and associated documents. The application relates to a restoration development for the purpose of an activity requiring a Waste Permit to be issued by the Meath County Council. Significant further information/revised plans submitted on this application			
Blackwood Equestrian Centre	South-East	2.5 km	Granted consent
Kildare planning reference 191031. Proposed two storey stable block, consisting of 6 no. horse stables & 7 no. pony stables, a wheelchair accessible toilet & two no. stairwells at ground floor level, tack room, kitchen/dining/lounge area for refreshment purposes (for staff and patrons of the livery centre only), male and female changing rooms and toilets and an office at first floor level (total floor area 494.6 sq.m), proposed horse walker (305.8 sq.m) and horse lunge (305.8sq.m) with proposed dungheap/effluent tank (18.5 sq.m). Existing concrete slab to be demolished and removed off site to authorised waste facility and to install proposed exercise area (1732 sq.m) to include 6 no. floodlights & equine fencing along the existing driveway and proposed exercise area. Permission is sought to install a septic tank and percolation area, 8 no. car parking spaces, gravel pathway to forest, proposed signage (2m sq) at existing gate and all associated site works at the above address. Permission is also sought to retain existing storage shed (24sq.m) and existing driveway.			
Drehid Landfill Extension	South	0.5 km	Granted consent
ABP reference 317292. Increase in waste material at disposal facility at Drehid Waste Management Facility to accept 440,000 tonnes per annum of non-hazardous waste material.			
Mixed Use Development in Enfield	North	3.9 km	Granted consent

Development	Direction from Proposed Development	Proposed Development site (km)	Status
The development will consist of: The construction of a mixed-use development including a 4 storey over ground floor level mixed use building (c.7,953 sq. m) comprising ground floor lobby (c.169 sq. m), bulky goods retail at ground (c.1,062sq,m) and first floor (c.l,219sq.m), ground floor cafe (c.304 sq. m), ground floor gym (c.352sq. m), first floor health centre (c.822 sq. m), second, third and fourth floor office and conference space (c.2,733 sq. m), core, circulation and plant facilities across all levels (c.1,292 sq.m) and 227 no. car and 80 no. cycle parking spaces to serve the building; 80 no. residential units comprising 1 3 no. 2 storey four-bedroom terraced housing units, 67 no. 2 storey three- bedroom terraced housing units with associated private open space in the form of rear gardens and terraces, 164 no. car and 320 no. cycle residential parking spaces plus 60 visitor cycle parking spaces; c.4,224 sq. m of landscaped public open space; a 2 storey creche facility (c.400 sq. m) with 12 no. car parking spaces; green roofs; solar panels; a two-lane access road linking the development to the roundabout where the R148 meets Dublin Road, providing 2 no. multimodal, priority-controlled junctions and segregated pedestrian and cyclist facilities with a controlled crossing; provision of roadway to access the development from the south via the existing roundabout on the Dublin Road; an internal road and shared surface network, including walkways and its associated infrastructure; watermain, foul and surface water drainage, extension to the proposed foul network and connection to the pump station (permitted under ABP-308357- 20), extension to the proposed watermain, connecting to the existing DN 300 HDPE adjacent to the R148 roundabout, an attenuation pond at the north east of the site (1770 sq.m); and all other ancillary site development works including hard and soft landscaping, boundary treatments, lighting, SuDs, and above and below ground services to facilitate the development.			
Royal Oaks Residential Development	North	3.9 km	Granted consent
Meath planning reference 2492, which is an extension of duration of reference SH304296. Construction of 133 no. dwelling units, creche and associated site works.			
68 residential units in Johnstown Bridge	North	1.8 km	Granted consent
Kildare planning reference 22488. Development of 68 No residential units comprising 59 No houses (10 No. 2 bed, 31 No. 3 bed and 18 No. 4 bed) and 9 No. maisonette apartments (8 No. 1 bed and 1 No. 2 bed) and a retail unit/cafe measuring 77.2 sq m, with heights ranging from two storeys to two storeys with attic accommodation over. The development also proposes a new vehicular entrance off Johnstown Road, ancillary car-parking; cycle parking; a pump station; hard and soft landscaping; lighting ;balconies; solar panels; boundary treatments; bin storage; ESB substation and all associated site works above and below ground.			

8.9.4.1.4 Forestry Management

The blocks of woodland overlapped by the northern section of the Proposed Development are subject to various forestry management interventions. These range from clear-felling and replanting commercial conifer areas to removing confers and replanting with broadleaved species, primarily pedunculate oak. Scots pine is also prevalent in more recently replanted areas. Forestry management can give rise to negative effects such as disturbance associated with harvesting, habitat loss, establishment of densely-shaded low-biodiversity conifer monoculture woodland, sedimentation and nutrient runoff. However, other aspects of forestry management can have positive ecological effects, particularly when close to nature silviculture is used or where the aim of management is to restore more natural woodland types and improve biodiversity. For example, replacement of commercial conifer blocks with native broadleaved species as recorded during current habitat surveys, or invasive species management to improve ecological functioning of woodland ecosystems.

In some cases, unintentional positive affects can also arise during intensive timber production, such as increased structural diversity and complex habitat mosaics during the pre-thicket stage, and establishment of semi natural woodland in areas which escape management such as marginal areas and wind thrown stands. Red squirrel also notably benefits from the presence of conifers as a food source.

8.9.4.1.5 Rehabilitation of Adjacent Bord Na Móna Bog

The draft rehabilitation plan for Timahoe North Bog concluded that the progress of natural revegetation is sufficiently advanced to forego interventions such as drain blocking and rewetting. The Proposed Development is not anticipated to give rise to significant indirect effects on this bog, due to the road setback distance, use of floating road construction and presence of existing drainage. As such, no cumulative effects in this regard are predicted.

8.9.4.2 Potential Cumulative Effects - Construction Phase

8.9.4.2.1 Designated Nature Conservation Sites

8.9.4.2.1.1 European sites

An accompanying Natura Impact Statement (NIS) has been prepared for the Proposed Development and accompanies this EIAR.

The NIS identified potential for cumulative (in-combination) effects on water quality which could contribute to indirect effects on conservation objectives for Kingfisher which is an SCI for the River Boyne and River Blackwater SPA. Similarly, potential for cumulative effects on water quality which could contribute to indirect effects on conservation objectives for river lamprey, Atlantic salmon and otter which are QIs for the River Boyne and River Blackwater SAC were identified in the NIS. Potential for cumulative effects on conservation objectives for alluvial woodland (QI habitat) via spread of invasive species were also identified in relation to the River Boyne and River Blackwater SAC.

With the implementation of mitigation, the NIS concluded the proposed development works will not adversely affect the integrity of the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA.

8.9.4.2.1.2 NHAs/pNHAs

As no direct or indirect effects are predicted on NHAs and pNHAs during construction of the Proposed Development, no additive effects in this category are predicted.

8.9.4.2.2 Habitats, Flora and Invasive Species

Potential direct effects during construction have been identified as land take during construction, which will lead to some permanent loss of habitat. Other existing or planned sources of land take in the vicinity of the Proposed Development may result in cumulative effects. However, land take from built development in the area is not sufficient to result in a significant in combination effect due to the relatively low ecological value of the primary habitats affected.

Other Development

Cumulative or in-combination effects may occur if there are effects which occur as the result of the likely effects of the Proposed Development interacting with the effects of other plans or projects in the relevant locality. Construction activities associated with Ballivor wind farm could foreseeably overlap the construction period of the Proposed Development. Due to the distance between the Proposed Development and Ballivor wind farm, no direct cumulative effects on habitats are predicted. There is however potential for the spread of invasive species either via the hydrological network and/or human activities.

A noted above in 1.9.4.1.1, cumulative effects on water quality in association with Yellow River or Ballivor wind farms are not predicted due to the large instream distances separating these projects with the Boyne catchment, in addition to their location on different watercourses within the catchment. There is no potential cumulative effect on water quality therefore as there is no cumulative risk from an increase in sediment to waterbodies.

In terms of other developments in the area, there are two consented and one proposed solar farms, including the adjacent Mulgeeth solar farm (Refused Feb. 2025 - may be appealed) and a number of other large-scale developments noted in Table 8-50 including housing developments. Therefore, there will be a cumulative effect in terms of habitat loss associated with these developments. As the habitat loss associated with the Proposed Development or Substation will not result in effects of county or international importance, it is not likely to contribute to significant cumulative effects in terms of habitats. There is however potential for cumulative effects on water quality to occur in conjunction with these planned developments in the locality in the event of overlapping construction phases (prior to mitigation).

Forestry

Afforestation and clear-felling is ongoing in the area in which the Proposed Development is located, and are likely to continue. Although proven to promote diversity in species such as birds during pre-thicket stages, mature conifer plantations may have less diversity than other semi-natural or natural habitats such as Bog Woodland or Raised Bog. Run-off from forestry activities may contribute to water quality effects in the area which may be added to cumulatively by the Proposed Development prior to mitigation. In the event of tree felling for forestry management occurring at or around the same time as felling for the Proposed Development , cumulative habitat loss effects could occur; however, as previously noted, the primary wooded habitat subject to loss would be Conifer Plantation of low ecological value.

8.9.4.2.3 Terrestrial mammals

Potential effects to mammals arising from habitat removal have been identified during the construction phase of the Proposed Wind Farm. There is potential for badgers to be injured prior to mitigation if setts are not buffered and/or excluded. Habitat removal if not mitigated will lead to some permanent loss of habitat resulting in an indirect effect on mammals in terms of foraging, breeding and resting habitat. Other existing or planned sources of land take in the vicinity of the Proposed Development may result in cumulative effects. However, land take from built development in the area is not sufficient to result in a significant in combination effect due to the relatively low ecological value of the habitats targeted for development i.e. intensively managed habitats.

Other Development

A noted previously, *Short-term Imperceptible* cumulative effects on water quality arising from other wind farm developments are predicted due to large instream distances separating the projects. As such there is no potential cumulative effect in this regard which could affect otter indirectly.

In terms of other developments in the locality, the proposed Mulgeeth Solar Farm is of primary relevance due to potential for local mammal populations to overlap this project, the Proposed Development and Proposed Substation. Prior to mitigation, a *Short-term Slight* cumulative effect could occur for badger.

There is potential for cumulative effects on water quality to occur in conjunction with the large-scale planned developments in the locality in the event of overlapping construction phases. A *Short-term Slight* cumulative effect on otter could arise from this.

Forestry

Felling and reforestation activities could contribute to cumulative disturbance effects resulting in *Short-term Moderate* to *Significant* effects on all key mammal ecological receptors except for Irish hare prior to mitigation.

8.9.4.2.4 Bats

Potential cumulative effects on bats during the construction phase would be within the following categories:

- Displacement of populations
- Abandonment of young
- Mortality

Potential cumulative effects in these categories due to habitat loss/alteration associated with wind farms could potentially result in *Medium-term Significant* effects at the *Regional* level prior to mitigation.

Within the same categories, potential cumulative effects associated with solar farms, housing developments and land use practices could potentially result in *Medium-term Significant* effects at the *Local* to *County* level prior to mitigation.

8.9.4.2.5 Other Species

Other species may be similarly affected by land take, however given the large amount of displacement habitats available the overall in combination effect is assessed as near certain this would result in a *Short-term Imperceptible* effect. In terms of disturbance, there is potential for cumulative *Short-term Moderate* effects on common lizard in the event that Mulgeeth solar farm was constructed at the same time as Proposed Development.

8.9.4.2.6 Aquatic Ecology

The area in which the Proposed Development is located is subject to additional pressures on water quality and aquatic ecology, particularly in relation to agricultural activities and drainage maintenance works. Where wind farm construction and agricultural activities, forestry management and/or channel maintenance works occur at the same time there is the potential for in-combination or cumulative effects on local watercourses. The risk of such effects would, for example, greatly increase if such works were taking place during the winter months or times of very high rainfall. Peat extraction and associated operations could also have the potential to adversely affect water quality in the Blackwater (Longwood) subcatchment, and therefore could affect watercourses in-combination with the proposed Drehid Wind Farm.

A noted previously, *Short-term Imperceptible* cumulative effects on water quality arising from other wind farm developments are predicted due to large instream distances separating the projects. As such there is no potential cumulative effect in this regard which could affect aquatic receptors indirectly via water quality.

There is however potential for the introduction of pathogens imported from other catchments on machinery or equipment, in addition to potential for works to introduce invasive animal or plant vector material which could spread downstream and result in cumulative effects in conjunction with the other wind farms in the catchment (Yellow River and Ballivor). Prior to mitigation, a *Long-term Significant* cumulative effect could occur for in this regard.

The consented/planned solar farms and other planned developments in the locality would also have the potential to contribute to cumulative effects on water quality due to siltation or pollution, particularly in the event of overlapping construction phases. Prior to mitigation, a *Short-term Moderate* cumulative effect on water quality and aquatic ecology could occur.

8.9.4.3 Potential Cumulative Effects - Operational Phase

8.9.4.3.1 Designated Nature Conservation Sites

8.9.4.3.1.1 European sites

An accompanying Natura Impact Statement (NIS) has been prepared for the Proposed Development and accompanies this EIAR.

There is potential for similar effects to those identified for the construction phase detailed above in Section 8.9.4.2.1.1 to occur during the operational phase, but at lower magnitude.

With the implementation of mitigation, the NIS concluded the proposed development works will not adversely affect the integrity of the River Boyne and River Blackwater SAC and River Boyne and River Blackwater SPA.

8.9.4.3.1.2 NHAs/pNHAs

As no direct or indirect effects are predicted on NHAs and pNHAs during construction of the Proposed Development, no additive effects in this category are predicted.

8.9.4.3.2 Habitats, Flora and Invasive Species

No operational cumulative effects in these categories are predicted.

8.9.4.3.3 Terrestrial mammals

Since no land take is predicted for the operational phase and potential effects are limited to occasional disturbance, a *Local Short-term Not Significant* cumulative effect for mammals may occur.

8.9.4.3.4 Bats

Potential cumulative effects on bats during the operational phase would be within the following categories:

- Mortality
- Reduction of local populations.

Prior to mitigation, there is potential for cumulative effects to arise through turbine collision and barotrauma in conjunction with other wind farms in the region. As such, there is potential for *Long-term Significant* cumulative effects at the *Regional* scale.

8.9.4.3.5 Other Species

There is some potential for lizard, frogs and butterfly species to use the turbine bat felling buffers, potentially subjecting them to periodic disturbance during vegetation clearance to maintain vegetation at a low height in the felling buffers. As such, a *Local Short-term Moderate* cumulative effect for these species may occur.

8.9.4.3.6 Aquatic Ecology

Operational wind farms are not normally considered to have the potential to significantly effect on the aquatic environment. The main risk to watercourses is via water quality effects, when oils and lubricants are used on the site (e.g. infrastructure maintenance). If such substances leaked from the turbines or maintenance areas or were disposed of inappropriately, there is a risk of water contamination and subsequent effects to aquatic ecology.

However, the likelihood of this occurring is very low and unlikely to be a significant effect considering the low volumes of vehicular traffic involved in typical wind farm operations.

Due to the natural 'grassing-over' the drainage swales and revegetation of other exposed surfaces, and the non-intrusive nature of site operations, there is a negligible risk of sediment release to watercourses during the operational stage, which would be limited to the initial stages of operation. Potential cumulative operational phase effects on aquatic ecology and water quality are considered *Short-term Slight* in the Local Context, prior mitigation.

In terms of water quality, only developments with a discharge to the same catchment can act cumulatively. Solar projects and housing developments, once operational, do not tend to have a discharge to surface waters and therefore it is unlikely that significant cumulative effects will occur.

8.9.4.4 Potential Cumulative Effects - Decommissioning

The potential cumulative effects during decommissioning are considered to be similar to those described for the construction phase of the Proposed Wind Farm, but reduced.

8.10 Mitigation Measures

8.10.1 Mitigation Measures During Construction

8.10.1.1 Mitigation by Avoidance and Design (Proposed Wind Farm & TDR)

The following measures were undertaken to reduce effects on designated sites, flora and fauna through avoidance and design:

- The hard-standing areas of the wind farm have been kept to the minimum necessary, including all site clearance works to minimise land take of habitats and flora.
- Larger turbines have been utilised to minimise the number of turbines, reducing the total rotor envelope (less turbines) and footprint of the proposed development.
- Site design and layout deliberately avoided direct effects on designated sites and sensitive habitats such as raised bog, wet heath and mature broadleaved woodland.
- Care has been taken to ensure that sufficient buffers are in place between wind farm infrastructure and hydrological features such as rivers, lakes and streams. Access roads were the exception to the rule in that river crossings will have to take place; however, where possible, existing stream crossings have been utilised. Clear span bridges are to be used at the three stream crossing points on site to reduce the potential effect on stream beds and to avoid instream works (foundations will be located 2.5m from the river edge).
- Any works in or around watercourses will adhere to best practice as per NRA and IFI guidance for works potentially affecting watercourses.
- The use of floating road construction for access tracks in the vicinity of raised bog habitats will minimise potential for indirect drainage effects on these habitats.
- The use of piled foundations in areas near raised bog habitats will minimise foundation excavation volumes, thereby minimising potential indirect drainage effects on raised bog habitats.

8.10.1.2 Mitigation by Avoidance and Design (Proposed Substation & Grid Connection)

The following measures were undertaken to reduce effects on designated sites, flora and fauna through avoidance and design:

- The hard-standing areas of the Proposed Substation has been kept to the minimum necessary including all site clearance works to minimise land take of habitats and flora.
- Site design and layout deliberately avoided direct effects on designated sites and sensitive habitats. Specifically, the design avoided encroachment on the adjacent mature broadleaved woodland habitats to the east of the substation compound.

8.10.1.3 Project Ecologist

A Project Ecologist/Ecological Clerk of Works (ECoW) with appropriate experience and expertise will be employed for the duration of the construction phase to ensure that all the mitigation measures outlined in relation to the environment are implemented. The Project Ecologist/ECoW will be awarded authority to stop construction activity if there is potential for significant adverse ecological effects to occur.

This mitigation measure is applicable to the Proposed Wind Farm, Proposed Substation, Grid Connection and TDR.

8.10.1.4 Habitats

The area of the proposed works will be kept to the minimum necessary, including all site clearance works, to minimise disturbance to habitats and flora. In this case, the footprint of the Proposed Wind Farm and Proposed Substation have been kept to the minimum necessary, including the use of layout design methods to minimise excavation works.

No disturbance to habitats or flora outside the Proposed Wind Farm and Proposed Substation works areas will occur. All works and temporary storage of material will be restricted to the immediate footprint of Proposed Wind Farm and Proposed Substation works areas, which will be wholly within their respective site boundaries. Designated access points will be established within the site and all construction traffic will be restricted to these locations.

A Habitat and Species Management Plan (HSMP) is included in Section 8.12. This details habitat restoration measures which are designed to avoid/minimise any potential conflicts between the Proposed Wind Farm and Proposed Substation and the positive effects of increasing habitat diversity in close vicinity to operational turbines. An appropriately qualified and experienced ecologist will review, implement/supervise and, where required, amend the proposed Habitat and Species Management Plan.

Protection of Raised Bog (Proposed Wind Farm)

In order to protect the existing raised bog and nearby groundwater wells from the effects of dewatering, groundwater cut-off techniques (such as sheet piling) will be used in preference to lowering of the water table (dewatering) during excavation and construction works in the vicinity of raised bog areas. This will avoid the possibility of significant drainage of the adjacent peat bogs. It should also be noted that the majority of excavations close to peat bogs will not extend much deeper than the existing drainage network. Any dewatering will be temporary, during construction only and will not have time to cause drainage of the peat, which due to the low permeability of the peat would result in very slow drainage. It is also proposed, following landowner agreement that drain blocking is carried out in the remnant area of raised bog to improve its condition; this would be a slight beneficial effect.

Hedgerow and Treeline Reinstatement (Proposed Wind Farm)

Any re-instated habitats such as Hedgerows will utilise native species suitable for the area.

Hedgerow and treeline planting will be carried out for the Proposed Wind Farm. This will reinstate or replace linear habitat loss to ensure no net loss of these habitats occurs.

New hedgerows will be planted along the outer perimeter of turbine buffers at T1, T2, T4 and T5 (see Table 8-52) within the proposed wind farm site to mitigate linear wooded habitat loss and enhance and maintain connectivity in the agricultural landscape. Ash is not currently proposed to be used due to it's vulnerability to ash dieback disease (ADB). However, if proven ADB resistant varieties of ash are available at the time of planting they can be used, in addition to other large-growing native species such as Alder and Oak. Smaller thicket-forming species such as elder, hazel and blackthorn will also be planted. Semi-mature specimens (heavy standard size) of native provenance will be included to accelerate establishment of new linear wooded habitats.

8.10.1.5 Invasive Species

The following measures are applicable to the Proposed Wind Farm and Proposed Substation.

Prior to works, an invasive species survey will be undertaken in the area to reconfirm the findings of the EIAR.

The invasive species plan and management plan (ISMP) (Appendix 8.1-8) will be adhered to for works in any areas where invasive species are present.

Halting the spread of non-native invasive species can be achieved via prevention, containment, treatment and eradication.

Prevention

Proposed Wind Farm

The Schedule III species *Rhododendron ponticum* was recorded in within the Proposed Wind Farm boundary in mixed broadleaved/conifer woodland adjacent to a section of proposed access track south of T8 (c. 15m from proposed T8 hard standing/20m from access track felling corridor), and also recorded in conifer plantation c. 170m north-east of T9 (outside Proposed Wind Farm boundary). Snowberry is present c. 15m from a section of proposed access track. Cherry laurel is present at two TDR POIs (1 & 3).

Where feasible, interaction with invasive species and surrounding areas potentially containing vector material will be prevented. If baseline conditions persist, prevention of the spread of invasive species by avoidance may be feasible. If this is not feasible then containment, treatment and eradication as detailed below will be required.

Proposed Substation

No invasive species are present within the Proposed Substation footprint. As such, if baseline conditions remain unchanged, interaction with proposed works is avoidable. Due to the possibility of spread of invasive species in the intervening period, a preconstruction invasive species survey is required as part of the invasive species management plan (ISMP) (Appendix 8.1-8). Containment and eradication measures are detailed in the ISMP which will be used as required in the event of changes to the invasive species baseline.

Containment, Treatment, Eradication

The presence sycamore and butterfly bush within the Proposed Wind Farm footprint, in addition to their tendency to spread reproductively means that containment measures will be required for these species. The following measures are also applicable to *Rhododendron ponticum,* cherry laurel and *s*nowberry in the event that preconstruction surveys detect any risk of spread due to new growths becoming established within or in close proximity to the proposed works footprint.

- Cordoning off the area – this shall include a buffer of 5m surrounding the area of infestation to ensure that seeds are not transported to other sections of the site via vehicular traffic, equipment or PPE.
- No machinery or personnel shall be allowed within this restricted area. Similarly, there shall be no storage of materials within or adjacent to this restricted area.
- There shall be no vegetation clearance or trimming within the cordoned area (except where undertaken in accordance with the invasive species management plan) as this can lead to the species recolonising other areas via the wind, water if displaced into drains, or soil and vegetation attached to machinery, vehicles or personnel.
- If Schedule III species are present, no soil or vegetation shall be removed from this area unless it is securely contained and is transported under licence to a suitably licenced facility for treatment.
- For non-schedule III species, no soil or vegetation shall be removed from this area unless it is securely contained and is to be disposed of appropriately onsite or transported to a suitably licenced facility for treatment.
- Wheel washes, draining to secure waste receptacles will be implemented at the site entrance to prevent the possible spread of any invasive species via vehicular movements.
- All site machinery will be inspected for the presence of potential invasive plant vector material and where required will be washed down before entering the site to prevent inadvertent transport of invasive plant species vector material.

- Any site machinery intended for use in or near aquatic habitats will be washed down and sterilised before entering the site to prevent inadvertent transport of invasive species vector material.
- Site machinery working in areas with potential for invasive species to occur will be checked and washed down prior to exiting these areas and moving to other parts of the proposed site.
- Informing all site staff through toolbox talk as part of site inductions.
- Any new sightings of the species shall by relayed to construction staff and the developer via the project ecologist/ECoW. These areas shall follow the same protocol as described above.
- Reporting sighting(s) to the NPWS and NBDC and liaising with the NPWS.

Treatment and eradication options for each species are detailed in the ISMP. The eradication of the area of *Rhododendron ponticum* recorded near T8 is proposed in order to remove this reservoir which if left untreated would continue to pose an ongoing risk of site-wide infestation over the long term. Removing this source of infestation at construction stage will prevent more arduous control measures later on if this species was left unchecked and spread throughout the site. Physical removal of mature plants outside the flowering season, followed by targeted herbicide stump treatment and annual follow-up spraying of any new emergent shoots is considered to be the optimal eradication strategy.

The other area of *Rhododendron ponticum* (100m east of Proposed Wind Farm/c. 170m north-east of T9) will require monitoring during the operational phase.

8.10.1.6 Terrestrial Mammals

A pre-construction mammal survey will be undertaken within the potential zone of influence of the Proposed Wind Farm and Proposed Substation in order to reconfirm the existing environment as described in the EIAR. Any updates to mitigation measures as required to ensure their continued efficacy will be made based on the pre-construction survey results.

An ecologist will supervise areas where vegetation, scrub, treeline and hedgerow removal will occur prior to and during construction as appropriate (e.g., an ecologist may be required during some clearance works of areas where vegetation is too dense to check beforehand). This will ensure that any site-specific issues in relation to wildlife not currently present (e.g. badger setts) on site will be identified prior to commencement of works so as to allow appropriate mitigation measures to be put in place.

In the event that an issue arises, the NPWS will be updated, consulted with and the relevant guidelines will be implemented as appropriate (e.g. NRA guidelines), in accordance with relevant legislation (Wildlife Acts and animal welfare legislation).

Construction operations within the proposed Drehid Wind Farm will take place predominantly during the hours of daylight to minimise disturbances to faunal species at night. Some works may occur at night but the project ecologist/ECoW shall limit night-time works to areas which avoid sensitive features (e.g. mature treelines).

Where possible, tree felling in forestry areas will be limited to time periods outside which pine martens may have young in dens (March and April). If this is unavoidable than areas to be clear felled will be surveyed in advance by a suitable qualified ecologist to determine whether any occupied pine marten dens are present. If necessary, a license under the Wildlife Act will be applied for should any sites have to be disturbed.

Where possible, any required tree felling of trees in forestry areas will be limited to time periods outside which red squirrel may have young in dreys (peak period January to March). If this is unavoidable than areas to be clear felled will be surveyed in advance by a suitable qualified ecologist to determine whether any occupied dreys are present. If necessary, a license under the Wildlife Act will be sought.

8.10.1.6.1 Badgers

A pre-construction mammal survey including a reconfirmatory survey for any new badger setts will be undertaken within the potential zone of influence of the Proposed Wind Farm and Proposed Substation in order to reconfirm the existing environment as described in the EIAR. In the event that a new badger sett should be encountered at any point, then NPWS will be informed and *Guidelines for the Treatment of Badgers Prior To the Construction of National Road Schemes* (NRA, 2008c) and will be followed.

A total of 21 badger setts were observed within the study area during current surveys. Mitigation proposed for these setts is detailed in Table 8-51, and additional details on specific locations are included in the confidential badger mitigation report which accompanies this application. The presence of four additional badger setts in the surrounding hinterland is also noted (see Table 8-19). All of these setts are over 150m from proposed infrastructure and construction activities and as such they do not require detailed assessment or mitigation. Their presence is noted as they are relevant when assessing the local badger population at the landscape scale.

A total of two subsidiary setts (Setts 1 & 2) are located within 30m of proposed infrastructure but are separated by a deep drainage channel, screened by vegetation and face away from works. As such, it is proposed to keep these setts open during construction (with monitoring) since they are unlikely to be damaged or disturbed, and would not be used for breeding. A total of two setts (Setts 4 & 7) are overlapped by proposed works to the degree that controlled destruction following exclusion or hard blocking is required. It is proposed to excavate within 30m of one sett (Sett 5) under ecological supervision following exclusion or hard blocking, but to retain the remainder of the sett and re-open it following construction. This course of action is proposed due to potential for the majority of the sett to remain intact, and to avoid additional tree felling which would be required to excavate the whole sett.

A total of two setts: Setts 19 (main sett) and Sett 20 (subsidiary) require hard blocking for the duration of construction, following exclusion as required. One sett (Sett 21) requires screening to provide a noise/visual barrier for the duration of construction.

The remainder of setts require monitoring or no mitigation measures. All main setts will be retained, and will be kept open in the majority of territories.

The exception to this is Sett 19. This main sett requires exclusion outside the breeding season followed by hard blocking for the duration of construction, however the presence of a nearby large Annex sett (Sett 21) located 120m from Sett 19 within the same densely vegetated field boundary provides an adequate alternative resting and breeding place while Sett 19 is hard blocked. A noise/visual barrier will be erected along the north-west and south-west edges of the site compound to screen Sett 21 from the site compound during construction.

No requirement for an artificial sett has been identified due to retention of the majority of setts, and availability of suitable alternative setts which will remain open and undisturbed near areas where setts are required to be excluded/hard blocked during construction. The option to create an artificial sett will be retained nonetheless (see confidential badger report).

Table 8-51: Proposed Badger Mitigation

Sett No.	Type	Closest Infrastructure/Activities	Mitigation
1	Subsidiary	Proposed northern access track (27m) Proposed northern access track felling buffer (20m)	Monitoring. This sett is separated from proposed works by a deep drain, vegetation cover and faces away from works.
2	Subsidiary	Proposed northern access track (21m) Proposed northern access track felling buffer (14m)	Monitoring. This sett is separated from proposed works by a deep drain, vegetation cover and faces away from works.
3	Main	Existing access track to form part of northern site access route (115m) Substation compound (250m)	Monitoring
4	Annex	T6-T7 access track (0m) Overlapped by access track and access track felling buffer.	If inactive - hard blocking/if active - exclusion during non-breeding season. Followed by controlled destruction prior to access track construction.
5	Annex	T6-T7 access track (12m) Access track felling buffer (5m)	If inactive - hard blocking/if active - exclusion during non-breeding season. Preconstruction check, ecological supervision and controlled excavation of road footprint within 30m of sett. Monitoring. Reopen following construction.
6	Main	T6-T7 access track (158m)	Monitoring
7	Annex	T5 hard stand (overlaps sett)	If inactive - hard blocking/if active - exclusion during non-breeding season. Followed by controlled destruction prior to hard stand construction.
8	Subsidiary	T5 hard stand (83m) T5 felling buffer (20m)	Monitoring
9	Subsidiary	T4 (590m)	None Required

Sett No.	Type	Closest Infrastructure/Activities	Mitigation
10	Main	T3 (623m)	None Required
11	Annex	T3 (607m)	None Required
12	Subsidiary	T3 (461m)	None Required
13	Outlier	T3 (252m)	None Required
14	Outlier (potential)	T2 felling buffer (76m) Access track (89m)	Monitoring
15	Main	Access track (89m) T2 felling buffer (147m)	Monitoring
16	Subsidiary	Access track (137m) T2 (186m)	Monitoring
17	Subsidiary	Access track (101m) T2 (126m)	Monitoring
18	Annex	Access track (127m) T2 (155m)	Monitoring
19	Main	Access track (10m) Site compound (24m)	If inactive - hard blocking/if active - exclusion during non-breeding season. Monitoring. Reopen following construction.
20	Subsidiary	Site compound (27m)	If inactive - hard blocking/if active - exclusion during non-breeding season. Monitoring. Reopen following construction.
21	Annex	Site compound (38m)	Erect noise/visual barrier during non-breeding season to screen sett from site compound. Monitoring.

The following overarching rules govern exclusion and hard blocking activities:

Disused and inactive setts

In the instance of disused setts or setts verified as inactive, and to prevent their reoccupation, the entrances shall be lightly blocked with vegetation and a light application of soil (soft blocking). The purpose of soft-blocking is to confirm that an apparently inactive sett is not occupied by badgers.

If a sett is deemed active after soft blocking a motion detection camera will be installed to confirm species and the number of individuals present.

If all entrances remain undisturbed for a minimum of five days, setts will be hard-blocked immediately using stone and wire mesh, under the supervision of an experienced and suitably qualified ecologist.

Hard-blocking is best achieved using buried fencing materials and compacted soil with further fencing materials laid across and firmly fixed to blocked entrances and surrounds. Where destruction is proposed, If all entrances remain undisturbed for a minimum of five days, setts will be immediately destructed under ecological supervision.

A report detailing evacuation procedures, sett excavation and destruction, and any other relevant issues will be submitted to the planning authority to confirm mitigation has been completed in accordance with Wildlife Acts and relevant NRA Guidance.

Active setts

Where field signs or monitoring reveal any suggestion of current or recent badger activity at any of the sett entrances, the sett will require thorough evacuation procedures.

Inactive entrances will be soft and then hard-blocked as described for inactive setts, but any active entrances will have one-way gates installed (plus proofing around sides of gates) to allow badgers to exit but not to return. The gates will be tied open for three days prior to being set to exclude. Sticks will be placed at arm's length within the gated tunnels to establish if badgers remain within the sett.

Gates will be left installed, with regular inspections, over a minimum period of 21 days (including period with gates tied open) before the sett is deemed inactive. Any activity at all will require the procedures to be repeated or additional measures taken. The sett will be monitored regularly for signs of occupancy. Once all badgers have been excluded from active setts, these will be immediately hard-blocked (using a stone and wire), and where destruction is proposed, setts will be destructed under the supervision of an experienced and suitably qualified ecologist. Hard-blocking is best achieved using buried fencing materials and compacted soil with further fencing materials laid across and firmly fixed to blocked entrances and surrounds.

A toolbox talk shall be provided to all construction workers accessing the site to raise the awareness of the species. If badgers do attempt to reoccupy the site all works shall cease within 30m of this area and the project ecologist/ECoW shall consult with NPWS. The area shall be treated as an active sett and the procedure outlined above shall apply in full.

A report detailing evacuation procedures, sett excavation and destruction, and any other relevant issues will be submitted to the planning authority to confirm mitigation has been completed in accordance with Wildlife Acts and relevant NRA Guidance.

Vegetation clearance

There is the potential for further setts to be discovered during vegetation clearance works. Care will need to be taken during this early stage of the development and a competent ecologist will be required on-site for these works. If further setts are discovered all works within 30m of the sett shall be ceased including vegetation clearance. In the event a new sett is established prior to construction, suitable mitigation measures will be implemented as required (in accordance with NRA Guidelines - 2008c) for the new sett. An activity survey shall be carried out to assess the potential for the sett to be used by badgers. And the steps followed above under the titles 'Disused and Inactive Setts' and/or 'Active Setts' will be followed.

Measures to prevent the injury of badgers during proposed mitigation measures

In the event that a badger is found injured during the implementation of proposed mitigation measures, it is important to realise that injured badgers will be frightened and can be very dangerous. They are strong animals and are not used to being handled, so no attempt will be made to touch an injured badger, as this could result in workers being bitten. NPWS shall be contacted along with ISPCA and potentially a vet specified by NPWS capable of treating the species.

Badger sett destruction

Due to overlaps with the proposed works areas, controlled destruction following exclusion or hard blocking are proposed at two badger setts (Setts 4 and 7). These measures would also to apply to any new setts which become established within or near the proposed footprint prior to construction.

The destruction of a successfully evacuated badger sett will only be conducted under the supervision of an experienced and suitably qualified ecologist, and in accordance with NRA (2006) guidelines. Destruction will be undertaken with a tracked 12-25 tonne digger, commencing at c. 25m from the outer sett entrances and working towards the centre of the sett, cutting c. 0.5m slices in a trench to a depth of 2m. Exposed tunnels will be checked for recent badger activity, with full attention paid to safety requirements in so doing.

The sett will be destroyed from several directions, in the above manner, until only the central core of the sett remains. The excavator will be operated by a competent person who has been fully briefed beforehand on the situation and procedures to be implemented whereby a badger may still be in occupation despite best practices being employed.

Once it is ensured that no badgers remain, the core will then also be destroyed and the entire area back-filled and made safe. Sett excavation will be concluded within one working day, as badgers may re-enter exposed tunnels and entrances.

A report detailing evacuation procedures, sett excavation and destruction, and any other relevant issues will be submitted to the planning authority and also circulated to NPWS. The artificial sett will be in place in advance of construction in order to provide an alternative resting and breeding place for badgers affected by unavailability of existing setts due to construction activities.

Other setts are available to compensate for the loss of Setts 4 and 7; these will remain open during construction.

8.10.1.6.2 Otter

A pre-construction mammal survey will be undertaken within the footprint of the development to reconfirm the existing environment as described in the EIAR. In the event that a new otter holt should be encountered at any point, then NPWS will be informed and *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (NRA, 2008d) will be followed.

Works will be restricted to the Proposed Wind Farm and Proposed Substation footprints, ensuring no activities are undertaken in areas which could potentially result in disturbance to otters.

Due to the distance separating Holt 1 from proposed infrastructure (over 150m), no mitigation other than trail camera monitoring is required.

In the case of the low-potential inactive Holt 2, due to unsuitability for breeding otter, no mitigation other than trail camera monitoring is required. Similarly, the burrow north of T6 which could potentially be used as a holt but currently lacks any signs of use by otter will require trail camera monitoring.

A report detailing the results of monitoring surveys will be submitted to the planning authority.

A toolbox talk shall be provided to all construction workers accessing the site to raise the awareness of the species. If otters do attempt to reoccupy the site all works shall cease within 30m of this area and the project ecologist/ECoW shall consult with NPWS. The area shall be treated as an active holt and the procedure outlined above shall apply in full.

Vegetation clearance

If new holts are discovered during vegetation clearance works. Care will need to be taken during this early stage of the development and a competent ecologist will be required on-site for these works.

If a new holt is discovered all works within 30m of the holt shall be ceased including vegetation clearance. NPWS shall be contacted and a derogation licence shall be sought for the new holt.

An activity survey shall be carried out to assess the potential for the holt to be used by otters and whether or not it is a breeding female. Any measures undertaken following discovery of a new holt will be in accordance with *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (NRA, 2008d) and licensing requirements.

Measures to prevent the injury of otter during proposed mitigation measures

In the event that an otter is found injured during the implementation of mitigation measures, it is important to realise that an otter is a wild animal so if injured it is highly likely to be frightened and can inflict injury. As a wild otter is not used to being handled, do no attempt to touch an injured otter, as this could result in workers being bitten. NPWS shall be contacted along with ISPCA and potentially a vet specified by NPWS capable of treating the species.

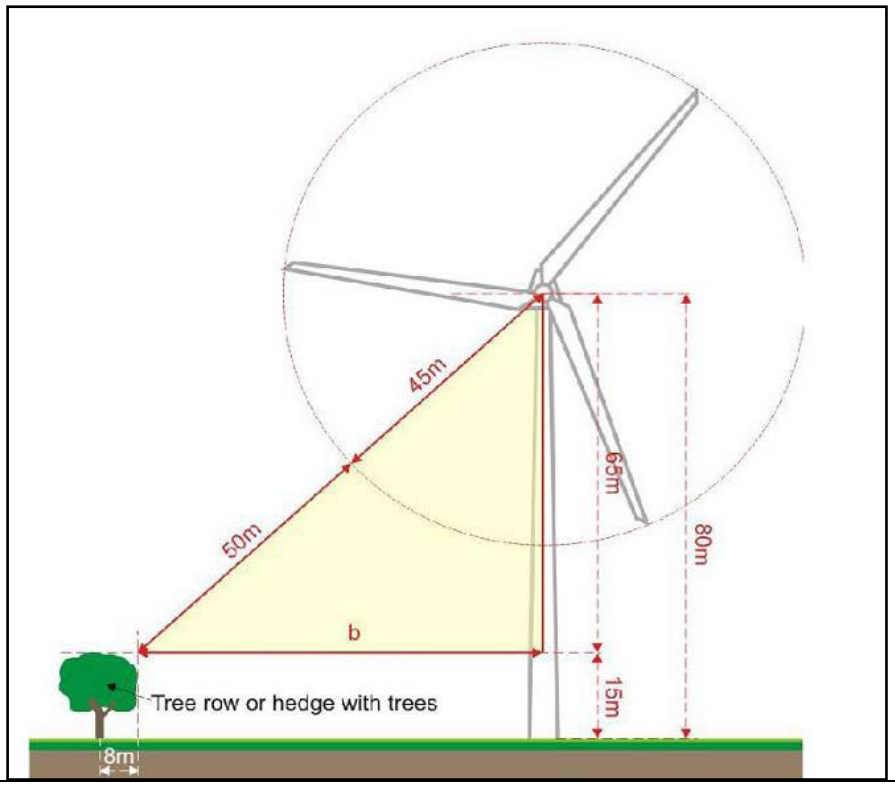
8.10.1.7 Bats

8.10.1.7.1 Vegetation Buffer

According to SNH (2021) guidance:

"The Eurobats guidance recommends a 200m buffer around woodland areas. There is, however, currently no scientific evidence to support this distance in the UK and it is recommended that a distance of 50m between turbine blade tip and nearest woodland (or other key habitat features such as wetlands etc.) is adequate mitigation in most, lower risk situations. Exceptionally, larger buffers may be appropriate, e.g. near major swarming and hibernation sites. The longevity of wind farms should also be taken into account and the maximum growth, or management, of woodland and other relevant habitat features considered in their planning. "

These distances were taken into account during the design phase of the development. The following formula was used to calculate the required felling buffer for each turbine (taking into account the height of surrounding woodland/plantations at each turbine location):



$$b = \sqrt{(50 + bl)^2 - (hh - fh)^2}$$

where:

b = the distance on the ground between the edge of the canopy and the turbine (m)

bl = blade length (m)

hh = hub height (m)

fh = tree/hedgerow height

Each of the locations of the eleven turbines was surveyed and the vegetation height informed the application of the dimensions of the blade tip buffer at turbine locations, dependant on the surrounding habitat and turbine specification. The likely growth of hedgerow/treeline/forestry was taken into account for the calculation. Surrounding habitats, height of surrounding trees and felling buffer calculated using the above equation are included in Table 8-52 below.

It should be noted that the proposed hub height for T1 is 81.4m for T1, versus 100.5 for all other turbines, resulting in a larger felling buffer for T1 compared to other turbines with the same height of surrounding vegetation.

To minimize risk to bat populations, a buffer zone is recommended around any treeline, hedgerow, woodland feature, into which no part of the turbine should intrude. The buffers recommended for each turbine are presented in Table 8-52.

Table 8-52: Assessment of potential turbine/bat conflict zones [1]

Turbine number	Habitats Requiring Felling	Surrounding Tree/Hedgerow Height (fh/m)	Felling Buffer Radius (m)
T1	Hedgerow/Treeline Mosaic	12	93.5
T2	Hedgerow/Treeline Mosaic	12	75.8
T3	Hedgerow/Treeline Mosaic	12	75.8
T4	Hedgerow/Treeline Mosaic	12	75.8
T5	Hedgerow/Treeline Mosaic	12	75.8
T6	Conifer Plantation	20	84.2
T7	Conifer Plantation, Mixed Broadleaved/Conifer woodland, Bog Woodland	15	79.1
T8	Mixed Conifer Woodland, Mixed Broadleaved/Conifer woodland, Bog Woodland, Scrub	12	75.8
T9	Conifer Plantation	15	79.1
T10	Conifer Plantation	6	68.1
T11	Conifer Plantation, Mixed Broadleaved/Conifer Woodland, Bog Woodland	20	84.2

Existing trees / scrub will be cleared around ten proposed turbines, T1, T2, T4, T5, T6, T7, T8, T9, T10 and T11 to provide a vegetation-free buffer zone around each turbine. The minimum distance has been taken into consideration for felling of conifer plantation around wind turbines. All buffers will be maintained throughout the lifetime of the wind farm. Due to sufficient existing separation from treelines, T3 does not require any felling to achieve the required 75.8m buffer.

It is noted that an enlarged buffer using a 90m distance from turbine blade tips to surrounding vegetation was recommended to be implemented in the 2019 bat assessment. This was based on high Ecobat activity levels for Leisler's bat for a number of turbines. Since the current assessment indicates none of the turbine locations are above low/moderate risk for Leisler's bat, this precautionary extension of the felling buffers is not required.

The following mitigation measures for bats are recommended:

[1] Based on turbine hub-height and blade length which for T1 is 81.5 and 66.5 m respectively and 100.5m and 66.5m respectively for all other turbines.

8.10.1.7.2 Supervision of vegetation clearance

An ecologist/ECoW will supervise areas where vegetation, scrub and hedgerow removal will occur prior to and during construction as appropriate (e.g., ecologist may be required during some clearance works of areas where vegetation is too dense to check beforehand).

It is recommended to complete clearance work during the autumn and spring months. Complete clearance work at least 6 months prior to installation of wind turbines. Studies have shown that bats are attracted to clear felled forestry areas due to increase insect loading. This has been shown to occur for a period of 3-6 months before the insect loading reduces to precleared felled levels.

8.10.1.7.3 Diversion from turbines via Hedgerows and Treelines

Linear features such as hedgerows and treelines serve as commuting corridors for bats (and other wildlife). Vegetation buffer clearance around turbines will alter commuting and foraging routes associated with existing hedgerows and woodland edges to avoid bats entering the rotor sweep zone of turbines. Hedgerow and treeline planting will be carried out for the Proposed Wind Farm. This will reinstate or replace linear habitat loss to ensure no net loss of these habitats occurs.

Where hedgerows and treelines are affected by turbine clearance buffers, bats will be directed away from tree-free buffers along an alternative commuting route. Where bat buffers are applied, the surrounding hedgerows and treelines should act as commuting corridors, leading bats away from the turbine location, and these hedgerows should not end abruptly at the bat buffer zones. This will be achieved by planting new pollinator-friendly hedgerows, connecting existing hedgerows onsite, around the bat buffers. Willow and Alder will be included in these hedgerows due to their rapid growth. It is proposed to create double lines of hedgerow, with Willow on one side, and pollinator-friendly hedgerow species listed below on the other. Planting of these species will be staggered to prevent excessive shading and aid establishment of the hedgerows.

All hedgerow planting is required to use plants of native provenance. The landscaping contractor is required to be informed well in advance to allow the acquisition of suitable native stock. 2–3-year-old alder and willow trees are required for hedgerows to help accelerate establishment. These will be supplemented with planting of whips.

The following fast-growing damp tolerant species are to be planted along the inner edges of these hedgerows: grey willow *Salix cinerea* and alder *Alnus glutinosa*. The following native fruiting hedgerow species are to be planted along the outer edges of these hedgerows: blackthorn (*Prunus spinosa)*, elder (*Sambucus nigra)*, Holly *(Ilex aquifolium)* and rowan *(Sorbus aucuparia)*.

Tightly cut hedgerows with flat tops provide little benefit to wildlife; taller and bulky hedgerows are required as this provides more shelter for wildlife. When the hedgerows are maintained, stems will be cut a little above the last cut as cutting back to the exact same point depletes the energy of the hedgerow, forms a build-up of scar tissue which discourages new growth.

Light annual cutting of hedgerows is not good for wildlife as it limits the production of flowers and fruit. The sites hedgerows will be cut every three to four years in rotation if cutting is required, as this will leave areas of undisturbed hedgerows. Cutting equipment used will be sharp so as not to shatter or fray the hedge. Shattering and fraying allows for disease to enter plants and can lead to decay and weaken the vigour of the hedgerow. A finger-bar cutter is recommended as the most appropriate tool to minimise fraying and smashing of branches (Heritage Council, 2017). A flail-type hedge cutter is unsuitable for hedge trimming in situations where hedgerow health is a priority.

Hedgerow maintenance will not be carried out between the 1st of March and 31st of August as this is the nesting period for birds and any maintenance at this time will disturb breeding; this is in keeping with the Wildlife Act 1976 (as amended).

8.10.1.7.4 Lighting restrictions

In general, artificial light creates a barrier to bats so lighting should be avoided where possible. Brown Long-eared Bat and Whiskered Bat are highly averse to artificial night lighting. Artificial night lighting will be avoided throughout the site. Construction operations within the wind farm site will take place during the hours of daylight where possible to minimise disturbances to faunal species at night. Where lighting is required, directional lighting (i.e. lighting which only shines on work areas and not nearby countryside) will be used to prevent overspill.

This can be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only.

It is understood that flashing red aviation lights will be provided on perimeter turbines. These will not negatively effect bats (Bennett and Hale, 2014).

8.10.1.7.5 Pre-construction Surveys

If three years lapse from between planning-stage surveys in 2023 and installation of the wind turbines, it will be necessary to repeat one season of surveys during the activity period prior to construction. Future survey work will be completed according to best practice guidelines available (SNH, 2019/ 2021; Hundt, 2012 & Collins, 2023).

A survey of trees proposed to be felled to search for potential bat roosts prior to construction.

Based on current surveys, a total of 12 trees with potential for use by individual or small numbers of bats are present within turbine felling buffers and will require felling if the wind farm is granted permission. This will result in the loss of potential or actual bat roosting (and foraging) opportunities. Best practice in tree-felling with respect to protection of potential bat roosts should be employed, including pre-felling emergence surveys and hiring a climbing specialist with bat training and licensing to check roost features with an endoscope for bats where necessary.

The eight trees with PRFs or potential for PRFs along the TDR potentially subject to effects from vegetation trimming will require similar measures (pre-trimming works emergence surveys and where required inspection at height).

If new bat roosts are present in areas affected by proposed felling, a bat derogation license will be sought from the National Parks and Wildlife Service.

8.10.1.7.6 Relocation/Retention of Bat Boxes and PRFs

Bat boxes 4 and 5 adjacent to the proposed/existing access route will be replaced with new boxes (4a and 5a) located directly north along the woodland edge bordering agricultural fields (approx. location ITM 676282 737906). This will mitigate any direct effects to these bat boxes associated with upgrade works to this section of access track, in addition to providing boxes in optimal condition for use by bats.

Following confirmation that bats are absent prior to felling, the tree PRF (knothole in trunk) of tree C will be retained and relocated to the riparian zone along the Fear English River North of T4. This will be achieved by cutting out the section of trunk containing the PRF following felling, and strapping it to a suitable mature tree along the Fear English riparian zone at similar height (3m or higher). If this is not feasible, a bat box will be provided along the Fear English riparian zone.

8.10.1.8 Other Species

Pre-construction surveys for breeding frog will be undertaken within the development footprint to reconfirm the findings of the EIAR and account for the potential time lag between EIAR surveys and the proposed construction phase. These will consist of searching suitable areas for spawn clumps during February as per NRA guidelines. In the event that frog spawn is found within the development footprint, this will be translocated under licence to suitable receptor sites outside the Proposed Wind Farm footprint. Where breeding ponds could potentially be indirectly affected, measures to prevent effects (alternative drainage routing, control of contaminants) will be implemented where feasible. Where effects cannot be avoided, construction will not take place in these areas during frog breeding season (January to June). These restrictions shall be localised to the areas were frog spawn is found. There is potential for an indirect effect on frogs and smooth newt due to water quality changes from erosion/sediment or pollutants. Weekly inspections of the erosion and sediment control measures on site will be required during the construction period, triggering remedial measures in the event of reduced efficacy. All measures to protect aquatic ecology and prevent reductions in water quality will also protect frogs and smooth newt.

For common lizard, vegetation will be felled and removed near the proposed turbine locations outside of the peak breeding season (July-August) to displace any lizards present and reduce the risk of effects and injury to individuals. This measure will be implemented in areas of suitable habitat as per the findings of the lizard report (Appendix 8.1-6) (Triturus, 2023) (i.e. proposed grid connection and turbine T11 but also T6, T8 & T9 based on previous findings). Furthermore, targeted pre-construction surveys, and where required relocation will be conducted at the proposed works locations known to support common lizard, with trapping methodologies employed to maximise lizard capture and minimise risk to overall lizard populations.

Preconstruction surveys for marsh fritillary (habitat appraisal, and if any change to the baseline suitable habitat is detected also a follow-up larval web survey) will be undertaken to reconfirm the findings of the EIAR. If optimal habitat establishes and marsh fritillary larvae are found within the Proposed Wind Farm footprint prior to construction, translocation of turves and larval webs to suitable receptor areas outside the footprint will be undertaken. This will be achieved by marking the location of pupae/larvae, and carefully excavating the surrounding sod under ecological supervision. Translocated sods will be placed in receptor sites which have been excavated to receive the sods. Receptor sites will be located nearby in similar habitat with abundant *S. pratensis*. If required, translocation will be carried out immediately following the survey during September to ensure pupae/larvae can be relocated.

A pre-construction reconfirmatory survey for key ecological receptor bee species requiring mitigation (Barbut's cuckoo bee, Barbut's Cuckoo Bee, gipsy cuckoo bee, large red tailed bumble bee and patchwork leafcutter bee) will be carried out within the development footprint during other pre-construction surveys (mammal, amphibian and reptile surveys). In the event that a colony is found within the footprint, the structure will be left in situ until the bee's breeding cycle is complete, and then translocated prior to construction works.

8.10.1.9 Aquatic Ecology

IFI advice arising from consultation has been taken into account in design of watercourse crossings, and mitigation measures contained in this section.

A Surface Water Management Plan is included in the CEMP, and has regard to guidelines included in 'Guidelines for the crossing of watercourses during the construction of national road schemes' (NRA, 2008b) and 'Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters' (IFI, 2016). This is considered to be the key mitigation measure for the protection of aquatic species located in downstream receiving waters. The Surface Water Management Plan will set out measures to avoid siltation, erosion, surface water run-off and accidental pollution events which all have the potential to adversely affect water quality within the site during the construction phase. It will also include preparatory works on the site, including installation of silt fences and bunds.

A CEMP has been prepared and this will be distributed to all parties involved in the construction of the wind farm site (including any sub-contractors) in order to protect aquatic interests within the study area.

All access tracks have been designed to minimise excavation on the site and reduce the risk of sediment runoff. A sealed silt fence will be placed at both sides of the crossing points and to a minimum of 10m upstream and downstream of each crossing at both sides of the road. Swales for turbine bases and hard standings will be constructed.

All infrastructure shall have a setback 50 m away from all streams within the site except for the watercourse crossings and the southern temporary compound which is within 15m of the Fear English River. Where site tracks are existing rather than a new site track, this buffer will not apply. Any access tracks crossing watercourses will be constructed as clear span bridges, where instream works are not permitted.

Where access tracks pass close to watercourses, silt fencing will be used to protect the streams. The maintenance and monitoring of such silt fences will be subject to an on-site quality management system set out in the CEMP.

Spoil heaps from the excavations for the turbine bases and trenches (where cables are to be buried) will be covered with geotextile and surrounded by silt fences to filter sediment from the surface water run-off from excavated material. Berms will be compacted and planted with native species seed mixes to promote soil stabilisation and minimise sediment runoff; the berm north-east of T5 will be surrounded by silt fencing until vegetation has been established in the following growing season to minimise potential for sediment runoff into the adjacent drainage ditch. If cables will be installed in trenches, they will be located underneath and directly adjacent to access tracks as far as possible. Trenches will be excavated during dry periods where possible in short sections and left open for minimal periods to avoid acting as a conduit for surface water flows. Clay bunds will be constructed within any cable trenches at intervals.

An Emergency Erosion and Silt Control Response Plan is included as a contingency in the CEMP, which details the required measures for the Contractor to implement in the event of an emergency on the site. Timing of the proposed works will also take account of the fisheries constraints within the study area, where no works will be undertaken in the instream environment during the salmonid close season (October–March annually), which also avoids the lamprey spawning season, as a precautionary measure.

Secure concrete washout areas have been designated on site and are detailed in the CEMP. Standing water in the excavations at the turbine bases will contain an increased concentration of suspended solids. The excavations will be pumped into temporary settlement basins as necessary which will be lined, and which will drain into existing or proposed drainage channels on site. The settlement basins will be constructed in advance of any excavations for the turbine bases.

Wheel washing facilities will be provided at the site entrance draining to silt traps. Additional silt fencing will be kept on site for the ongoing maintenance of the structures provided. Portaloos will be used to provide toilet facilities for site personnel. Sanitary waste will be removed from site via a licensed waste disposal contractor and will not be discharged on site.

Any diesel or fuel oils stored on site will be bunded to 110 % of the capacity of the storage tank. Such facilities will not be located near any drain or watercourse. Design and installation of fuel tanks will be in accordance with best practice guidelines. Refuelling of plant during construction will be carried out in designated areas within site the site compound 50m away from watercourses, draining to an oil interceptor. A 100m buffer from watercourses shall apply for any refuelling carried out using mobile bowsers. Drip trays and spill kits will be kept available on site. Appropriate containment facilities will be provided to ensure that any spills from the vehicle are contained and removed off site for disposal at an appropriately licensed facility.

Appropriate preventative measures have been detailed within the CEMP to ensure that non-native aquatic/riparian species are not introduced into the site. These measures follow the relevant manual 'The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads' by NRA (2010). While no high threat non-native aquatic invasive species were recorded at the survey sites during the current survey, the potential for the introduction of aquatic invasive species onto the site from other areas remains.

Strict biosecurity measures will be implemented if plant and machinery working in areas with invasive species along the grid route is used at the wind farm site. All machinery shall be disinfected and visually inspected before leaving works areas where invasive species are present.

To reduce the risk of invasive species and pathogen introduction (e.g. Crayfish plague), all equipment intended for use within or in the vicinity of aquatic habitats will be thoroughly checked, cleaned and dried in accordance with best practice as specified in the CIRIA C532, C648 and C741 guidelines below. Furthermore, plant machinery which has worked within riparian corridors or come in to contact with water will be steam-cleaned and dried in advance of works commencement in the Blackwater catchment.

Works will adhere to the guidelines set out in the best practice documents as listed below:

- CIRIA (2001). Control of water pollution from construction sites - Guidance for consultants and contractors (C532). Construction Industry Research and Information Association, London.
- CIRIA (2006). Control of Pollution from Linear Construction Project; Technical Guidance (C648). Construction Industry Research and Information Association, London.
- CIRIA (2015a). Manual on scour at bridges and other hydraulic structures, second edition (C742). Construction Industry Research and Information Association, London.
- CIRIA (2015b). Environmental Good Practice on Site (4th edition) (C741). Construction Industry Research and Information Association, London.
- CIRIA (2019). Culvert, screen and outfall manual (C786). Construction Industry Research and Information Association, London.
- DHPLG (2019). Draft Revised Wind Energy Development Guidelines. Department of Housing, Planning and Local Government. December 2019
- Enterprise Ireland (unknown). Best Practice Guide (BPGCS005) Oil storage guidelines.
- IFI (2016). Guidelines on Protection of Fisheries during Construction Works in and adjacent to waters. Inland Fisheries Ireland, Dublin.
- IFI (2019) Windfarm scoping document (draft). Inland Fisheries Ireland, Dublin.
- IWEA (2012). Best Practice Guidelines for the Irish Wind Energy Industry. Guidance prepared by Fehily Timoney and Company for the Irish Wind Energy Association.
- Kilfeather, P.K. (2007). Maintenance and protection of the Inland Fisheries resource during road construction and improvement works. Requirements of the Southern Regional Fisheries Board. Southern Regional Fisheries Board, Clonmel, Co. Tipperary

- Murphy, D.F. (2004). Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin.
- NRA (2008). Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes. National Roads Authority.
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note);
- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note);
- SNH (2012). Assessing the cumulative impact of onshore wind energy developments. Scottish Natural Heritage, March 2012.
- SNH (2019b). Good Practice during Wind Farm Construction (4th edition). Scottish Natural Heritage.

In addition to the above, all mitigation measures to protect water quality detailed in Chapter 10 Hydrology and Water Quality shall apply.

8.10.2 Mitigation Measures During Operation

8.10.2.1 Designated nature conservation sites

Mitigation measures outlined in section 10.9.3 and Chapter 10 - Hydrology and Water Quality of this EIAR, will be implemented, in addition to those described in the NIS to minimise and prevent the identified indirect effects on water quality as outlined previously.

8.10.2.2 Ecological walkover check - bat felling buffers

An ecological walkover survey covering the bat felling buffers will be undertaken prior to mechanical vegetation clearance to maintain these buffers as tree and scrub-free zones. This survey will ensure any potentially sensitive receptors which may establish in the buffers during the operational phase are detected prior to clearance, allowing significant effects to be avoided via avoidance/timing and other suitable mitigation as required. Species-specific surveys encompassed within the general ecological walkover survey are discussed further where applicable below (Sections 8.10.2.3 to 8.10.2.7).

8.10.2.3 Habitats, Flora & Invasive Species

Mitigation measures outlined in section 10.9.3 and Chapter 10 - Hydrology and Water Quality of this EIAR, will be implemented, in addition to those described in the NIS, to ensure that there will be no contamination of water bodies due to siltation or contaminated run-off during the operational phase.

A post-construction Annex I survey and habitat assessment will be carried out on the intact raised bog adjacent to T9 and T10 to determine the habitat condition and monitor the effectiveness of design/avoidance mitigation measures in preventing drying out of this habitat.

Invasive species will continue to be monitored, and where required, treated within the project area according to the invasive species management plan for as long as they persist within the site. Monitoring will entail site-wide checks, and will also focus specifically on the Rhododendron growth 100m east of Proposed Wind Farm/c. 170m north-east of T9, and checking for invasive species in bat felling buffers prior to periodic mechanical clearance works.

In the event that any invasive species are detected during the operational phase in areas where they could potentially interact with/be spread by operational activities, the procedures and control measures detailed in the ISMP (Appendix 8.1-8) will be followed.

8.10.2.4 Mammals

In the event that a new badger sett is discovered during maintenance of bat felling buffers (vegetation trimming), NPWS will be informed and the relevant guidance *Guidelines for the Treatment of Badgers Prior To the Construction of National Road Schemes* (NRA, 2008c) and will be followed.

The bat buffer pre-clearance badger survey shall extend 50m beyond the bat felling buffers.

8.10.2.5 Bats

8.10.2.5.1 Feathering of Blades

Turbines will operate in a manner which restricts the rotation of the blades as far as is practicably possible below the manufacturer's specified cut-in speed (SNH 2021). This is usually achieved by feathering the blades during low wind speeds; the angle of the blades is rotated to present the slimmest profile possible towards the wind, ensuring they do not rotate or 'idle' when not generating power.

Turbine blades spinning in low wind can kill bats, however bats cannot be killed by feathered blades which are not spinning (Horn et al., 2008). The feathering of turbine blades combined with increased cut-in speeds have been shown to reduce bat fatalities by up to 50% (SNH 2021). As such, the feathering of blades to prevent 'idling' during low wind speeds is proposed for all turbines.

8.10.2.5.2 Cut-in Speeds/Curtailment

While bat activity varied by species, no locations had activity for any species higher than low/moderate levels (based on Ecobat median percentile scores).

Therefore, increased cut-in speeds are not required from commencement of operation, but will rather be reserved for implementation where required based on operational monitoring (see Sections 7.2.3 and 7.2.4).

8.10.2.5.3 Post Construction Surveys

Monitoring of bat activity at turbine locations using static detectors will take place for at least three years after construction, providing sufficient data to detect any significant change in bat activity relative to pre-construction levels. It will assess changes in bat activity patterns and the efficacy of mitigation to inform any changes to curtailment requirements.

During years one to three of operation bat activity will be measured during monitoring periods between April and mid-October at each turbine location, in combination with carcass surveys. In addition, wind speed and temperature data will be continuously recorded at the nacelle height of each turbine.

Modern, remotely-operated wind turbines as proposed here allow cut-in speeds to be controlled centrally/automatically, facilitating an operation regime designed to minimise harmful effects to bats.

The feathering of turbine blades combined with increased cut-in speeds have been shown to reduce bat fatalities from 30% and up to 90% (Adams et al., 2021, Arnett et al., 2011, 2013; Baerwald et al., 2009). The most recent of studies showed a 63% decrease in fatalities (Adams et al., 2021).

8.10.2.5.4 Operational Curtailment

Monitoring will be carried out for the first three years of operation, and an annual review at the end of each of these years will determine whether increased cut-in speeds should be implemented.

If, following any of the initial three years of post-construction surveys, bat activity increases above the baseline and/or remains consistently high and carcass searches indicate fatalities are occurring (refer below), increased cut-in speeds will be implemented.

Alternatively, if it is found that the results of bat activity surveys and fatality searches reconfirm the level of bat activity at turbine locations remains low or low/moderate then curtailment will not be required.

Bat activity will subsequently be monitored in years 5, 10, 15, 20, 25 and 30 with further review after each monitoring period.

Where post construction acoustic surveys are undertaken, they will utilise full spectrum automatic detectors deployed, as a minimum, for one complete bat activity season.

Acoustic monitoring will be supplemented with thermal imaging cameras etc. to provide more detailed information on bat activity in the vicinity of turbines.

An assessment of static data gathered during operational surveillance will be completed using the online analysis tool Ecobat as recommended by SNH (2021) as a minimum, or other equivalent guidance as dictated by up-to date standards and practices.

If the requirement for curtailment is identified following the initial 3-year monitoring period, the following measures will be implemented:

Increasing the cut-in speed above that set by the manufacturer can reduce the potential for bat/turbine collisions. A study by Arnett et al. (2011) showed a 50% decrease in bat fatality can be achieved by increasing the cut-in speed by 1.5 m/s.

Species with elevated risk of collision (Leisler's bat, soprano and common pipistrelle) in particular could benefit from increasing the cut-in speed of turbines, as dictated on a case-by case basis depending on the activity levels recorded at each turbine.

If required based on operational monitoring results, cut-in speeds should be increased to 5.5 m/s during the bat activity season (April-October) or where temperatures are optimal for bat activity, from 30 minutes prior to sunset and to 30 minutes after sunrise at turbines where surveillance shows high bat activity levels for High and Medium-Risk species and/or if bat carcasses are recorded.

The duration required depends on the level of mitigation required for each individual turbine i.e. a full bat activity season or only spring and autumn (duration will be determined by the first year of surveillance).

Cut-in speed restrictions will be operated according to specific weather conditions:

- When the air temperature is greater than 7°C (as bat activity does not usually occur below this temperature).
- Generally, bat activity peaks at low wind speeds (<5.5m/s). As such, it has been shown that curtailing the operations of wind turbines at low wind speeds can reduce bat mortality dramatically, particularly during late summer and the early autumn months.

Due to the considerable unnecessary down time resulting from the "blanket curtailment" and the advances in smart curtailment a focused curtailment regime is further proposed as an optional means of achieving the level of curtailment indicated as required by operational monitoring.

This will focus on times and dates, corresponding with periods when the highest level of bat activity occur within the Site. This includes the use of the SCADA (Supervisory Control and Data Acquisitions) operating system (or equivalent) to only pause/feather the blades below a specified wind speed and above a specified temperature within specified time periods.

Post-construction surveys will be undertaken for the first three years of operation to confirm if curtailment is required in line with post-construction activity levels. The post construction surveys will be used to update the curtailment regime (blanket curtailment) designed around the values for the key weather parameters and other factors that are known to influence collision risk. This will include all of the following:

- Wind speed in m/s (measured at nacelle height)
- Time after sunset
- Month of the year
- Temperature (ºC)
- Precipitation (mm/hr)

8.10.2.5.5 Buffer Zones

The vegetation-free buffer zones around the identified turbines will be managed and maintained during the operational life of the development.

Due to mitigation by design, turbines will be sited at a suitable separation distance from treelines/hedgerows and trees or vegetation will be removed to ensure a woodland-free buffer zone.

The immediate surroundings of individual turbines will be managed and maintained so that they do not attract insects (i.e. the concentration of insects in the wind turbine vicinity should be reduced as much as possible, but not such that insect abundancies affected elsewhere on the site). This should be achieved through physical management of habitats without the use of toxic substances.

The radius of each buffer zone as determined by the height of surrounding vegetation is listed in Table 5-1 above.

It is noted that no trees are present within the T3 buffer, and are also absent from other turbine buffers within agricultural land (apart from existing hedgerows). Currently, no management other than removal of trees within these buffers is required, due to ongoing agricultural management limiting vegetation within these buffers to low-growing grassland or cropland. However, vegetation management encompassing the entire extent of the buffers identified in Table 7-1 will apply in the case that regular grazing or tillage of these buffers ceases, and targeted intervention is required to keep vegetation short.

8.10.2.5.6 Monitoring of Mitigation Measures

The success of the implemented mitigation measures for bats on the project will be monitored for a period of three years post construction, with further monitoring in years 5, 10, 15, 20, 25 and 30. Appropriate measures will be taken to enhance prescribed mitigation if and where required. A recommended schedule for monitoring is given in Table 5-3 below.

8.10.2.5.7 Bat Fatality Monitoring

Whilst no significant residual effects on bats are predicted, the development could provide an opportunity to gain baseline data on bat/turbine interaction and it is recommended that the scheme be monitored for bat fatalities for the first three years of operation (post construction surveys) and subsequently in years 5, 10, 15, 20, 25 and 30 as part of the additional curtailment monitoring schedule. A comprehensive onsite fatality monitoring programme is to be undertaken following published best practice (e.g. SNH 2021 or equivalent at the time of operation).

The primary components of the mortality programme are outlined below:

1. Carcass removal trials to establish levels of predator removal of possible fatalities. This should be done following best recommended practice and with due cognisance of published effects such as predator swamping, whereby excessive placement of carcasses increases predator presence and consequently skews results. No turbines which are used for carcass removal trials should be used for subsequent fatality monitoring.
2. Turbine searches for fatalities should be undertaken following best practice in terms of search area (focusing on hard standing) and at intervals selected to effectively sample fatality rates as determined by carcass removal trials in (1.) above. [2]
3. A standardised approach with a possible control group and/or variation in search techniques such as straight line transects/ randomly selected spiral transects/ dog searches will be undertaken. This will provide a means of robustly estimating the post construction collision fatality effect (if any).
4. Recorded fatalities should be calibrated against known predator removal rates to provide an estimate of overall fatality rates.

8.10.2.5.8 Monitoring schedule

Table 8-53: Monitoring schedule recommended for bat mitigation measures

Mitigation measure	Monitoring required	Description	Duration
Bat boxes / PRFs	Monitor bat use	Bat boxes and PRFs to be placed at/moved to locations removed from wind turbines as determined by project ecologist/ECoW at least 1 season before construction start. These shall be examined by a licensed bat specialist according to NPWS recommendations. Records should be submitted to Bat Conservation Ireland for inclusion in its bat distribution database. Re-site if necessary. Annual cleaning required if well used by bats or if used by birds. Replacement if damaged/lost.	From mounting to 3 years post construction.

[2] Suitably trained dogs with handlers are significantly more efficient and faster than humans in locating carcasses and should preferably be used to achieve more robust results. Dog searches are, however, resource-demanding and may not always be necessary to identify if a problem exists.

Mitigation measure	Monitoring required	Description	Duration
Mortality study	Fatality monitoring	Corpse searches beneath turbines to assess the effect of operation on bats.	From initial operation conducted during years 1, 2, 3, 5, 10, 15, 20, 25 and 30 post construction.
Activity monitoring	Bat activity monitoring	Static detector surveys at detector locations during the bat activity season (between April and mid-October). Assessment of activity levels using Ecobat or other currently accepted analysis methods.	From initial operation conducted during years 1, 2, 3 post construction. Additional years to be surveyed if requirement is indicated by fatality monitoring.

Table 8-54: Summary of Operational-phase mitigation measures for bats

Moderate and Moderate-High Level Bat Mitigation Applies to XX Turbines
Operate the wind turbines in a manner that reduces the movement of the blades below the cut-in speed (e.g. by feathering the blades).
Implement a monitoring programme for the first three years of operation to ensure that bat activity is at a low level in vicinity of these turbines. Review monitoring results to determine if further bat mitigation measures are required.
Continue monitoring for 3 years post operation of the wind farm to determine whether a higher cut-in speed of the blades is required. The requirement for the continuation of monitoring across subsequent monitoring years (5, 10, 15, 20, 25 & 30) will be reviewed in consultation with NPWS.
Undertake a carcass search for 3 years post operation of the wind farm to determine whether a higher cut-in speed of the blades is required. Repeat searches in years 5, 10, 15, 20, 25 & 30.
Clear and maintain buffer zone free of woodland/trees within 50m of turbine blade tips.
Maintain buffer zones around wind turbines in a manner that does not attract insects.

8.10.2.6 Other Species

Maintenance of bat felling buffers (vegetation trimming), will be undertaken outside the bird breeding season (March- August inclusive). This measure will also avoid potential disturbance to common lizard and bee species during breeding periods.

The pre-clearance bat buffer ecological survey shall include a marsh fritillary habitat appraisal, followed if necessary by a larval web survey. This will ensure that suitable mitigation and avoidance measures can be implemented in the event that marsh fritillary establish in the bat felling buffers during the operational phase.

There is potential for an indirect effect on frogs or smooth newt due to water quality changes from erosion and sediment. Periodic inspections of sediment and erosion control measures will be undertaken until the risk of erosion or siltation has declined following the successful establishment of vegetation during the operational phase.

8.10.2.7 Aquatic Ecology

The operational wind farm will have a negligible effect on aquatic ecological receptors and fisheries, as there are no further potential effects on surface water run-off or watercourses within the site. During the operation phase, oils will be required for cooling the transformers giving rise to the potential for oil spills within the site. However, the transformers will be bunded to over 110 % of the volume of oil within them.

It is not envisaged that maintenance will involve any significant effects on the hydrological regime of the area. Periodic inspections of sediment and erosion control measures will be undertaken until the risk of erosion or siltation has declined following the successful establishment of vegetation during the operational phase.

Access to the site will be controlled using a gate to prevent harmful activities such as illegal dumping, unlicensed timber or peat extraction, or recreational use of off road vehicles.

8.10.3 Mitigation Measures During Decommissioning

8.10.3.1 Designated Sites

The same mitigation measures will apply for the decommissioning phase as for the construction phase.

8.10.3.2 Habitats

Following removal of the turbines, the bat felling buffers will be allowed to succeed to woodland. Pending landowner agreement, targeted removal of non-native species (e.g. conifers) (if they are overly dominant) will be undertaken to favour the establishment of semi-natural woodland. A small proportion of conifers can be retained to maintain a food source for red squirrel.

An appropriately qualified and experienced ecologist will review and, where required, amend the proposed Habitat and Species Management Plan and consult with NPWS to seek their views on the implementation of the proposed measures.

Any re-instated habitats such as Hedgerows will utilise native species suitable for the area.

8.10.3.3 Terrestrial Mammals

Similar mitigation measures will apply for the decommissioning phase as for the construction phase.

8.10.3.4 Bats

The same mitigation measures will apply for the decommissioning phase as for the construction phase.

8.10.3.5 Other Taxa

The same mitigation measures will apply for the decommissioning phase as for the construction phase.

8.10.3.6 Aquatic Ecology

In the event of decommissioning of the proposed wind farm, activities will take place in a similar fashion to the construction phase.

Due to the proposed retention of the roads, hard standings and electrical infrastructure, potential for effects on water quality and aquatic ecology will be reduced in comparison to construction. The only potential sources of siltation will be the areas of soil used to cover the turbine foundations. The mitigation measures outlined above for the construction phase will also be implemented as relevant for the protection of aquatic ecological interests during the decommissioning phase.

8.11 Residual Effects

8.11.1 Proposed Wind Farm & TDR

8.11.1.1 Habitats and Flora

Construction of the wind farm will lead to some permanent loss of habitat. The habitat loss will be the total area covered by the roads plus the footprint of each of the proposed turbines and all other wind farm infrastructure.

Not all land-take is permanent; the temporary compound and blade transfer areas will be reinstated following construction, and upon decommissioning the turbine foundations will be covered to permit re-establishment of semi-natural habitats, and modifications such as at roundabouts along the turbine delivery route will be reinstated. Any hedgerows to be re-instated will utilise locally sourced native species as part of a Habitat and Species Management Plan which shall minimise residual effects. Mitigation measures as outlined in the current chapter and Chapter 10 Hydrology shall ensure no significant loss of aquatic habitat.

Measures to be undertaken to deal with invasive species are included in the CEMP. With the application of the appropriate mitigation measures as outlined in the current chapter, it is considered that the effects of the Proposed Wind Farm will be minimised to an acceptable level, resulting in *Slight* Reversible residual effects at the Local scale (i.e. noticeable changes in the character of the environment without affecting its sensitivities).

8.11.1.2 Terrestrial Mammals (excluding bats)

Imperceptible Reversible residual effects at the Local scale on terrestrial mammals are envisaged following the implementation of mitigation measures during the construction phase, operation phase and the decommissioning phase.

8.11.1.3 Bats

With the implementation of mitigation measures, *Imperceptible* to *Not significant* Reversible residual effects at the Local scale are predicted for bats.

8.11.1.4 Other Species

With the implementation of mitigation measures, *Imperceptible* Reversible residual effects at the Local scale are predicted for other species.

8.11.1.5 Aquatic Ecology

The proposed wind farm will have an overall slight negative effect on aquatic ecology and fisheries during the construction phase in the local context in the absence of mitigation measures. However, this will be effectively reduced to an *Imperceptible* Reversible residual effect at the Local scale following the implementation of mitigation measures.

8.11.1.6 Natural Heritage Areas or Proposed Natural Heritage Areas

There are no links (e.g. hydrological or ecological links) between the Proposed Wind Farm and any of the national sites located within 15 km. With the implementation of mitigation measures, no residual effects as a result of the Proposed Wind Farm on the integrity of designated sites are predicted.

8.11.1.7 Coillte Biodiversity Areas

No significant residual cumulative effects have been identified for these areas.

8.11.1.8 Residual Cumulative Effects

No significant residual cumulative effects will remain following the implementation of mitigation measures.

8.11.2 Proposed Substation & Grid Connection

Construction of the proposed substation will lead to some permanent loss of habitat. A *Permanent Slight* Reversible residual effect at the Local scale will arise from habitat loss associated with the proposed substation.

For all other ecological receptors, residual effects will be *Long-term Imperceptible* Reversible residual effects at the Local scale.

8.12 Biodiversity Enhancement: Habitat and Species Management Plan

The Proposed Wind Farm seeks to further enhance biodiversity (separate from mitigation) where opportunities present themselves.

8.12.1 Drain Blocking

The perimeter drain running to the south-west of T10 located within the Dunfierth Coillte Biodiversity area will be blocked in order to further increase water retention within the intact raised bog. Drainage of a bog to facilitate peat harvesting lowers water levels, killing the peat forming community and drying up bog pools.

The installation of dams will be undertaken by an experienced ecologist. Drains will be dammed using plastic drain piling which is an alternative to peat dams. Plastic drain piling is chosen over peat as peat may not be freely available within the site. Plastic drain piling is light, sturdy, easy to transport and impermeable and has been used extensively used in Irish Peatland Conservation Council's (IPCC) Lodge Bog Nature Reserve, Co. Kildare and by Coillte[3].

[3] Irish Peatland Conservation website; Restoration of Drained Peatlands: http://www.ipcc.ie/advice/peatland-management-diy-tool-kit/restoration-of-drained-peatlands/ Website visited November 2018.

Plastic pilling sheets will adhere to that used by the IPCC; 3m lengths, 30cm wide with interlocking tongue and groove system and can be installed using a mallet (see Plate 8-29 below for more information).

Plate 8-40: Plastic pilling being installed within IPCC bog

Sourced from Irish Peatland Conservation Council (IPCC)

8.12.2 Planting of berms

As part of the construction phase, excavated peat will be reused to construct berms (see Figure 8-9). In order to further enhance site biodiversity, berms located in wooded areas outside bat felling buffers will be planted with native bog woodland whips. These planted berms will add to the existing linear habitats in the area and will provide further foraging, cover and commuting habitat for mammals and other fauna.

Within wooded areas, bog woodland bare root whips (60-90cm in height), sourced from native stock and disease free will be planted on selected berms outside bat felling buffers. Whips will be planted at 1m centres with the following mix: 20% downy birch (*Betula pubescens*), 10% holly (*Ilex aquifolium*), 15% rowan (*Sorbus aucuparia*), 20% scots pine (*Pinus sylvestris*), 10% pedunculate oak (*Quercus robus*), 10% sessile oak (*Q. petraea*) and 15% willow (*Salix cinerea*). Rabbit/hare protection will be put in place alongside weed suppressing leaf mulch. Any whips that die will be replaced (during the operational phase).

Berms in open agricultural habitats will be planted with native pollinator-friendly species.

8.12.2.1 Bee Banks

Bee banks will be incorporated within the proposed berms. These will be created and maintained by periodic scraping of vegetation from sections of the berms facing access tracks.

It is important to avoid heavily compacting bee banks with machinery. The road-facing sections of banks will be required to be kept clear of vegetation using mechanical means only. This can be carried out in winter as required (frequency depends on rate of re-vegetation) by scraping away vegetation.

8.12.3 Bird and bat boxes

Bird boxes (5 No.) will be placed within the limited treelines within the site. This will help to provide further breeding habitat for birds on the site.

Bat boxes (5 No.) will be placed in marginal areas with minimal connectivity to the Proposed Wind Farm. This will help to provide further roosting for bats while reducing ready-made commuting and foraging routes leading towards the turbine locations via the access track network. See Appendix 8.1-4 for details.

Within selected areas, bat boxes (see Plate 8-41) will be installed in suitable locations selected by an experienced ecologist.

Plate 8-41: Example of a Bat Box

Source: Paul van Hoof

Within selected treelines, kestrel (no. 2) and barn owl (no. 3) bird boxes (see Plate 1-30 and Plate 1-31) will be installed in suitable locations selected by an experienced ecologist. In the event that the selected treelines are not appropriate for bird box installation, trees within hedgerows where appropriate will be selected and bird boxes installed by an experienced ecologist.

(Source: RSPB)

Plate 8-42: Example of a Kestrel Box

(Source RSPB)

Plate 8-43: Example of a Barn Owl Box

8.12.4 Removal of non-native trees from Raised Bog/Scrub Mosaic

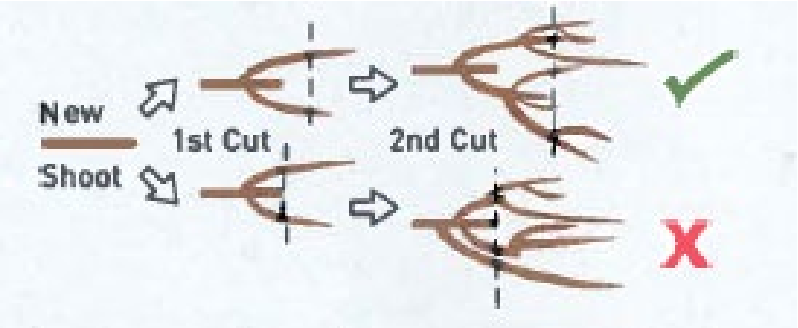
The clearance of the bat felling buffer for T8 will have the effect of enhancing this habitat mosaic by removing tree and scrub including non-native species which are colonising this area of drained degraded raised bog. Removal of these trees, along with periodic maintenance of the felling buffer will return this area to a more semi-natural state.

8.12.5 Enhancement of site hedgerows

In order to enhance hedgerows for biodiversity it is important to maintain hedgerows appropriately; allowing them to become tall and bulky so as to provide shelter and foraging habitat for wildlife. It is also important to fill gaps as they weaken the hedgerows role as wildlife corridors especially for bats.

Where practical, gaps in hedgerows will be filled via laying which is a method of rejuvenating hedgerows. Laying involves cutting hedgerow stems partly through near ground level and bending the stem to the required position to fill a gap. New growth then is produced from the cut which thickens the hedge base and rejuvenates it. Where gaps are too large and to enhance the diversity of the hedgerow, native seed and fruit bearing whip species will be planted.

Site hedgerows will also be allowed to grow bulky where practical; optimum hedgerow dimensions are 4-5m tall x 2-3m wide. The hedgerow will be cut every three to four years in rotation so that some hedgerows are left undisturbed. Cutting equipment used will be sharp so as not to shatter or fray the hedge. Shattering and fraying allows for disease to enter plants and can lead to decay and weaken the vigour of the hedgerow. When the hedgerow is cut, stems will be cut a little above the last cut (see Plate 1-32) as cutting back to the exact same point depletes the energy of the hedgerow and forms a build-up of scar tissue which discourages new growth.



Source:Teagasc

Plate 8-44: Hedgerow level of cut

8.12.6 Pine Marten Den Boxes

Den boxes are used to provide artificial breeding sites for pine martens, in areas where there is an absence of natural tree cavities. Five (5 No.) den boxes will be installed within the conifer plantation at the site.

(Source: NHBS)

Plate 8-45: Example of a Pine Marten Den Box

8.12.7 Insect Hotels

Insect hotels shall be installed at 6 locations within the site. The insect hotels will be made from recycled materials such as pallets, bamboo, old carpet, wire mesh (see Plate 8-46 for example). Each hotel will consist of several different sections that provide insects with nesting facilities – particularly during winter, offering shelter or refuge for many types of insects. Insect hotels are used as nest sites by insects including solitary bees and solitary wasps. These insects drag prey to the nest where an egg is deposited. Sections of these hotels will be specifically designed to allow the insects to hibernate, notable examples include ladybirds and butterflies. This shall also provide additional habitat for the Barbut's Cuckoo Bee.

(Source: www.bbcwildlife.org.uk)

Plate 8-46: Example of an Insect Hotel

8.12.8 Lizard Refuges

Artificial lizard refuges, for basking, shall be installed at four locations within the site. Examples of such refuges include corrugated iron sheets, carpet tiles, planks of wood, roofing felt or dark coloured mats. As lizards are cold-blooded, the dark coloured refuges will attract them because it soaks up the heat and it will be warmer than the surrounding ground.

(Source: ebay)

Plate 8-47: Example of a lizard basking platform

8.12.9 Refugia piles/ hibernacula

These provide sheltering locations for a wide range of wildlife; including reptiles, amphibians, small mammals and invertebrates. Refugia piles are produced by piling natural materials; such as logs, sticks and leaves; that can be supported by additional materials such as rubble and bricks to form a structure with many cracks and crevices for sheltering. Hibernacula are produced in a similar way, but often require setting into the ground in a shallow pit and topping with soil to enclose the structure and creating a more stable microclimate suitable for hibernating species. These refugia piles will also offer potential habitat for the larva of the micromoth *Nemapogon koenigi* which is reported to feed on fungus, especially bracket fungus, as well as on decaying wood, especially on birch.

These structures will be installed near hedgerows and in areas of woodland within the site, where they are less likely to be disturbed.

Plate 8-48: Refugia Piles

8.12.10 Retention of felled birch logs

Birch trees and logs felled during site clearance will be retained across the proposed development site in the form of log piles to provide a food source for the rare Micromoth *Nemapogon koenigi*, which has been reported to utilise rotting birch wood as a larval food source.

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